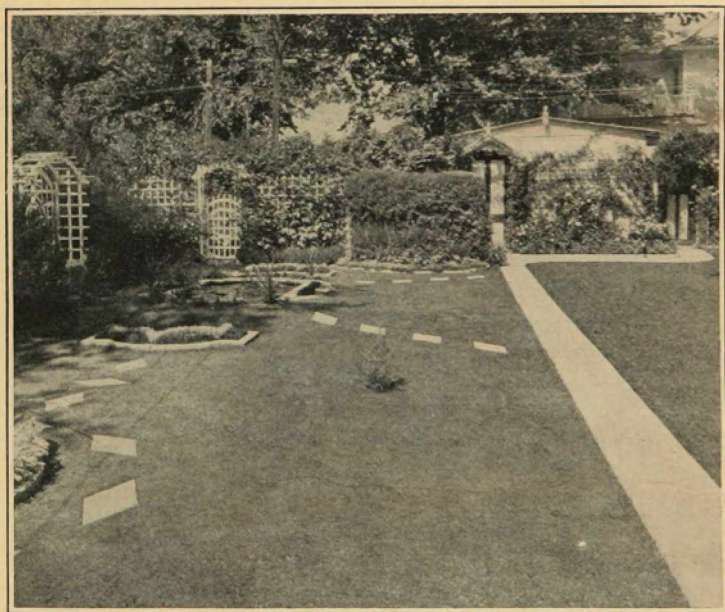


LAWNS

Planting and Maintenance in Colorado

By GEORGE BEACH



COLORADO STATE COLLEGE
COLORADO EXPERIMENT STATION
FORT COLLINS

The Colorado State College

FORT COLLINS, COLORADO

THE STATE BOARD OF AGRICULTURE

JAMES P. McKELVEY.....	La Jara	MRS. MARY ISHAM.....	Brighton
H. B. DYE, Pres.....	Manzanola	J. W. GOSS.....	Pueblo
O. E. WEBB.....	Milliken	J. J. DOWNEY.....	Cortez
T. J. WARREN.....	Fort Collins	R. F. ROCKWELL.....	Paonia

Ex-Officio { GOVERNOR EDWIN C. JOHNSON
PRESIDENT CHARLES A. LORY
L. M. TAYLOR, Secretary-Treasurer

OFFICERS OF THE EXPERIMENT STATION

CHARLES A. LORY, M.S., LL.D., D.Sc.	President
E. P. SANDSTEN, Ph.D.	Director
L. D. CRAIN, M.M.E.	Vice-Director
L. M. TAYLOR.....	Secretary
ANNA T. BAKER.....	Executive Clerk

EXPERIMENT STATION STAFF

Agronomy

Alvin Kezer, A.M., Chief Agronomist
David W. Robertson, Ph.D., Associate
Robert Gardner, M.S., Associate
(Soils)
*Warren H. Leonard, M.S., Associate
Dwight Koonce, M.S., Assistant
Robert Whitney, B.S., Assistant
(Soils)
Dean C. Anderson, M.S., Assistant
Otto Coleman, B.S., Assistant

Animal Investigations

George E. Morton, M.S., in Charge
H. B. Osland, M.S., Associate
Fred H. Leinbach, M.S., Associate
John O. Toliver, B.S., Assistant

Botany

L. W. Durrell, Ph.D., in Charge
Anna M. Lute, A.B., B.Sc., Seed
Analyst
Bruce J. Thornton, M.S., Associate
E. W. Bodine, M.S., Assistant
Melvin S. Morris, M.S., Assistant
A. O. Simonds, Ph.D., Assistant
C. G. Barr, Ph.D., Assistant

Chemistry

J. W. Tobiska, M.A., in Charge
Earl Douglass, M.S., Associate
C. E. Vail, M.A., Associate

Entomology

George M. List, Ph.D., in Charge
Charles R. Jones, Ph.D., Associate
Miriam A. Palmer, M.A., M.S.,
Associate
Leslie B. Daniels, M.S., Assistant

Home Economics

Inga M. K. Allison, M.S., in Charge
Mark A. Barmore, Ph.D., Research
Associate.

Horticulture

A. M. Binkley, M.S., in Charge
E. P. Sandsten, Ph.D., Horticulturist
Carl Metzger, M.S., Associate
George A. Beach, B.S., Assistant
Herman Fauber, B.S., Assistant
Ralph Manuel, B.S., Assistant
Louis R. Bryant, Ph.D., Assistant

Irrigation Investigations

R. L. Parshall, B.S., in Charge
Carl Rohwer, B.S., C.E., Associate
W. E. Code, B.S., Associate
R. E. Trimble, B.S., Meteorologist

Rural Economics and Sociology

L. A. Moorhouse, M.S., in Charge
R. T. Burdick, M.S., Associate
D. N. Donaldson, M.S., Associate
G. S. Klemmedson, M.S., Associate
H. B. Pingrey, M.S., Assistant

Pathology and Bacteriology

I. E. Newsom, D.V.M., in Charge
H. W. Reuszer, Ph.D., Associate
Bacteriologist
C. W. Barber, D.V.M., Ph.D., Assistant
A. H. Groth, B.S., D.V.M., Assistant
Frank Thorp, Jr., D.V.M., Ph.D.,
Associate

Engineering Division— Mechanical Engineering

L. D. Crain, M.M.E., Head of Division,
in Charge of Mechanical Engi-
neering

Civil Engineering

E. B. House, M.S., in Charge

Editorial Service

James R. Miller, Editor

*On leave.

LAWNS

Planting and Maintenance in Colorado

By GEORGE BEACH

"It's not a home until it's planted", and the planting is incomplete without the lawn.

It goes without saying that considerable time and labor are necessary to keep a yard clean and weed-free if no lawn is planted. So little extra work is required to sow and care for the lawn that the effort is amply rewarded by the increased satisfaction of its neat and tidy appearance.

The question is often asked whether there is not some lawn



A well graded surface is most desirable for starting the new lawn. Note the depth of excavation for filling in with good top soil.

grass for Colorado, other than the commonly-grown Kentucky Blue, that would require less sprinkling and mowing. Our native prairie grass lives with only Nature's care, but even under favorable conditions it is not a lawn grass. It must be clear at the outset that green-tinted concrete is the only laborless substitute for lawn.

Grading

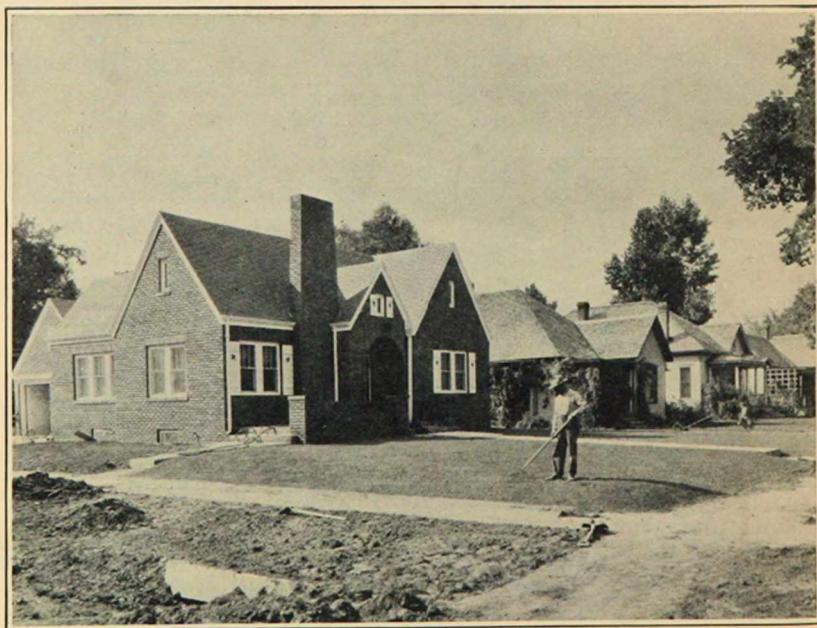
There are many places where a perfectly level lawn is the only practical grade; but where conditions permit, a rolling but well-drained surface is the most pleasing and natural. Large expanses of perfectly level lawn give a stiff, strained effect which is never found in nature.

If there are soft spots after putting the ground to grade, rolling is necessary to detect low places. Depressions readily seen then may be filled by raking. Re-rolling and re-raking will insure good surface drainage.

Time for Sowing

If plenty of water for sprinkling is available, the very best time of year to sow lawn grass is from August 15 to September 15. "Getting the jump" on weeds is the important point in late summer or fall planting, for the sod developed before winter is able to compete with next spring's weeds much more favorably than that from spring-sown seed.

Sowing may be done more or less satisfactorily at any time of year. We often hear of grass seed sown on snow. This is rather a hit-or-miss practice but will succeed if the seed bed under



Gradual drainage away from the house is preferable to the flat lawn. Note fineness of pulverization in seedbed.

the snow is in good condition; however, nothing is gained by waiting for snow when the ground is prepared beforehand.

If fall sowing is impossible, the next best time is early spring. March is preferable to April, if ground can be properly prepared that early.

Early spring is likely to be cold and damp, causing slow and irregular germination. In late spring or in mid-summer, weather is usually too hot for the best interests of grass seedlings, and sprinkling several times daily as well as shading with straw or burlap is necessary to prevent the surface crusting that kills so many seedlings.

Late summer and early fall are seasons when Nature sows her grass. At these times heat is less intense, and the approach of cool days encourages deeper rooting and moderate leaf growth. The opposite occurs in spring when weather is warming instead of cooling, thus encouraging too few roots, with an over-abundance of leaves.

Soil Requirements

Lawn may be grown on the subsoil piled over a yard from an excavation, but starting and maintenance are more difficult than when the surface soil can be restored after excavating. If planting the lawn is anticipated before building, the removal of 4 or 5 inches of surface soil before excavating, to be subsequently spread over the poorer soil, is an effort well worth while.

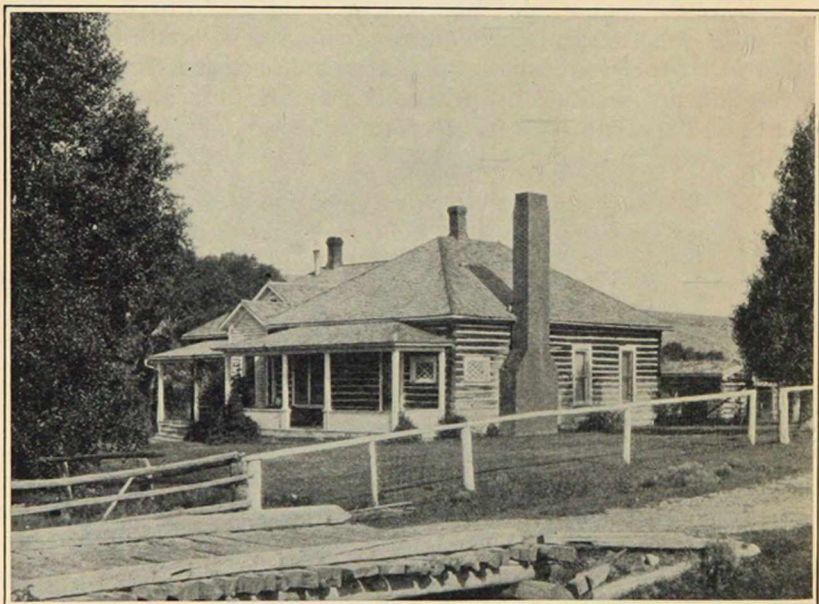
If the damage of covering good surface soil with subsoil is already done, working a heavy application of well-rotted manure into the upper 4 or 5 inches of soil is a good practice. If the lawn is to be planted on a light, sandy soil, a dressing of a few inches of clayey soil, as well as the manure, can be used very profitably, as the clay will increase the water retention of the soil. If clay is not worked into a very sandy soil, almost continuous sprinkling will be required to keep it in proper condition during warm months.

Soil Improvement Prior to Planting

Few soils are so good as not to be benefited by some system of soil improvement. In general, there are three such systems: The sowing and subsequent plowing under of a soil-improving crop, such as oats, rye, clover, and vetch; the working into the soil, or addition after sowing, of well-rotted manure, peat, or other materials of high organic matter content; and the use of commercial fertilizers.

The first method, plowing under a cover crop, is called green manuring. If soil lacks humus and is of poor texture generally, it will be considerably improved by the planting of a cover crop in spring which is plowed under a month or 6 weeks before sowing the lawn.

In the large majority of cases, a liberal application of well-rotted manure (100 pounds per 100 square feet) worked well into the soil will furnish all the plant nutrients necessary and increase the soil's capacity for water retention besides, because of the amount of humus it furnishes.



This mountain home is even more attractive by virtue of the pleasant lawn.

Commercial fertilizers, if used, should be in the "complete" forms, unless there is known to be a deficiency of certain elements. Two and one half pounds per 100 square feet is a moderate application of complete commercial fertilizer under average conditions. One pound on the same area of established turf is a good average application. These fertilizers are easily applied, are readily obtainable, carry no weed seed, and supply pure plant foods; but they must not be depended upon to improve the physical condition of soils.

Lime is not necessary on western soils, as acidity is not a soil problem here.

Varieties of Lawn Grass*

The foundation of most successful Colorado lawns is Kentucky Blue grass (*Poa pratensis*). This grass has a rich green color; its crowns are close to the ground; and after it is established it spreads rapidly by underground shoots.

White Clover (*Trifolium repens*) is used in many lawn mixtures. It starts rapidly—ahead of blue grass—and furnishes ground shade while slower grasses are getting started. Blue grass then will gradually crowd out the clover.

Perennial Rye grass (*Lolium perenne*) is an annual grass, coarse in leaf and stem, which starts rapidly and produces early effect as well as covering quickly ground that would otherwise support weeds. The use of this grass coarsens the lawn the first year, and it is useful only where quick effect is more desirable than fine appearance.

Redtop (*Agrostis palustris*) grows better under adverse soil and moisture conditions than most varieties of good turf grasses. It is a finer grass than rye but seldom is used by itself for lawn. When mixed with clover and Kentucky Blue, it helps to give a good effect the first season, but is gradually crowded out.

Carpet Bent (*Agrostis stolonifera*), widely known as Creeping Bent, is the type of grass commonly used for putting greens. The many varieties in trade necessitate careful selection when buying. The creeping stems or stolons of this grass take root at the joints or nodes and make a very dense mat of sod. Its habit of growth is more discouraging to dandelions than that of blue grass, and other things being equal, it requires less water than the blue grass lawn. Seed of this species is much more expensive than good blue grass and should be used only by those who are willing to give the lawn the care and study that a putting green merits. Chopped-up plants or stolons also may be had for planting in rows or for broadcasting. This material is costlier than seed but makes sod more quickly. Here again, careful and judicious buying are essential to success.

Bent grass has a logical place in grass seed mixtures, especially for turfs receiving hard wear. When used alone, however, bent grass flourishes in soils of slightly more acid reaction than most of those occurring naturally in Colorado. It is often difficult and expensive to maintain an acid reaction in our soils.

Bent grasses are a very special type of turf, and are confined,

* Names recommended by "Standardized Plant Names" of the American Joint Committee of Horticultural Nomenclature are used here.

CHARACTERISTICS OF FIELD SEEDS

Variety	Viability of good seed (percent)	Purity of good seed (percent)	Average germination one-year-old (percent)	Average length of vitality (years)	Weight of seed per bushel, legal (pounds)	Weight of seed per bushel, actual (pounds)	Number of seeds per pound, average
Bluegrass, Kentucky.	70-85	75-85	30-40	1-2	14	14-28	2,400,000
Bluegrass, Canada...	85	75-85	30-40	1-2	14	14-24	2,400,000
Clover, white.....	99	98	75	2	60	60-63	700,000
Fescue, meadow....	95	90	93	2	—	20-30	250,000
Redtop.....	95	95-98	—	6	14	12-40	4,135,900
Rye grass, perennial.	95	98	80	2	—	10-30	336,000

From Seed Trade Buyer's Guide, 1935.

even at the best golf courses, to the putting greens, while Kentucky Blue grass furnishes the much larger area in fairways. It has been stated that less water is required for bent grass, and that its close mat of growth chokes dandelions. These advantages, however, are small. Bent grass lawns need nearly as much water as other lawns, and dandelions do almost as well in them, if given a chance.

Rough Stalked Meadow grass (*Poa trivialis*) is a type of turf grass commonly used in mixtures for shady places and often may be used alone in deep shade. It makes a very desirable lawn and is particularly well adapted to shade and moist conditions, but usually does not last as long as blue grass.

Quality of Seed

A state law in Colorado requires the labeling of any package containing 5 pounds or more of the seed of lawn grass, clover, or lawn grass mixtures; such labels are required to show the percentage of germination and the amount of noxious weed seed present.

The law does **not** prohibit the sale of poor seed. Much inferior seed is lawfully sold for more than it is worth. On page 8 is a table showing what one should expect in quality of seed.

Weeds

In fighting weeds, as well as in any other battle, the best defense is a good offense. Lawns that are weedy and have thin stands of sod grasses either were not built right in the first place or have subsequently suffered from imperfect maintenance. If conditions are ideal for lawn grasses, weeds are a minor consideration.

The common weeds in Colorado lawns are described in Colorado Station Bulletin 310 (now out of print). Methods of eradication and control are discussed. The fact should be stated here, however, that proper feeding, watering, and mowing will do as much or more toward control of weeds than the most arduous methods of eradication.

Diseases

Of several fungous diseases of grass, the most common in lawns is known as brown patch, and even this one generally is of little importance outside the bent grass putting greens on golf courses. It is a disease encouraged by extreme heat and high humidity. It may be recognized early in the morning by the appearance of nearly circular spots, up to a foot in diameter, each with a smoky ring around the edge.

This disease attacks the leaf blades, seldom damaging the roots. Treatment is by drenching the areas with mercuric chlor-

ide or calomel, prepared as for earthworms and discussed elsewhere; but in home lawns it is often as well to let the disease run its course and the following fall rake up the soil in the patches and reseed them. This disease is encouraged by excessive night watering and excessive use of nitrogenous fertilizers.

A similar but different disease is called small brown patch, or dollar spot, which latter term describes the small size of the spots affected. This disease destroys both roots and blades, and yet is not so bad a pest as large brown patch. It appears at almost any time and not just in hot-weather periods.

Earthworms

Limited numbers of earthworms are beneficial to a soil, but they sometimes increase to damaging numbers in lawn.

Corrosive sublimate is an effective control for earthworms, when 2 to 3 ounces per 50 gallons of water are used on 1,000 square feet. Liberal watering should follow the treatment.

Grubs

The grubs of May beetle or June bug, though much more important pests in the East than here, are often pests in Colorado lawns.

The remedy is 5 pounds of lead arsenate (mixed into a bushel or so of sand or soil to assist in even spreading) applied in dry form to 1,000 square feet of turf or seed bed where grub injury is anticipated. When applied to turf, it should be brushed in immediately with broom, rake, or drag, and then watered.

Treatment is usually most effective in May or early June but may be applied at any time during the growing season.

Sowing

A good mixture of lawn grass for average conditions on Colorado home grounds consists of 6 parts of Kentucky Blue grass, 1 part Redtop, and 1 part White Clover by weight. The seed should be thoroughly mixed and then divided into 2 parts: one to be sown by walking back and forth in a north-south direction; the other to be sown at right angles, or in an east-west direction. At sowing time, there should be no soil lumps on the surface larger than a grain of wheat, and most of the soil should be as fine as sifted ashes. Seed should be covered by raking lightly or by sprinkling a thin coat of well-pulverized rotted manure, peat, or compost over the surface. Average conditions with good seed and a carefully prepared seed bed require a pound of seed per 200 square feet.

Maintenance

When starting a lawn during hot months, nearly constant

sprinkling is necessary to keep the surface from drying and cracking. Surface moisture retention is materially increased by a thin coat of some finely-pulverized vegetable matter put on after seeding. When the sod is established, a thorough soaking every few days, as weather demands, is much better than the usual perfunctory, twice-daily sprinkling. Watering in full sunshine is not harmful if it is a "soaker". Subsoil, as well as surface, should be wet. Blue grass roots penetrate $1\frac{1}{2}$ to $2\frac{1}{2}$ feet and often as much as 5 feet.

Set the mower medium high. Close-clipped grass stands less abuse than that cut $1\frac{1}{2}$ inches or higher. By mowing often enough that clippings are not unsightly, the necessity of using a grass-catcher is obviated, and the cutting is done in one half to one third of the time otherwise required. These short clippings mulch the soil so as to check drying to a certain extent, but of course a raking occasionally is in order if accumulated clippings become unsightly.

Fertilizers

Moderate amounts of fertilizer should be applied both spring and fall—sometimes even a little in midsummer. Manure applied to frozen ground, or put on so thickly that the turf cannot be seen, is often wasted in the drainage runoff.

Well-rotted, weed-free manure is the best kind of fertilizer. Soil from spent mushroom beds is excellent lawn dressing. Commercial fertilizers, when used, should be in the "complete" form, preferably with about twice as much nitrogen as the total of other elements.

To be sure that manure is weed-free, some such precaution as steaming, baking, or composting must be taken to eliminate or kill weed seeds. The inconvenience or expense of these processes leads many to the use of commercial fertilizers.

At least 10 times the weight of barnyard manure is necessary to supply the amount of plant food available in "complete" commercial fertilizers. One pound of the latter per 100 square feet of turf is a good average application.

Being so much more concentrated, more care in spreading the commercial fertilizers is necessary in order to avoid burning. There should be no lumps, and the material should be spread evenly, diluting it with sand or soil, if necessary, to assure even spreading. It should then be watered in, to wash the material off the grass blades. If grass is wet when commercial fertilizer is applied, there may be burning unless a thorough watering follows immediately.

It is suggested above that a good commercial fertilizer for

lawns should have about twice as much nitrogen as the total of other elements. Analyses that satisfy this requirement are those such as 10-6-4 and 8-5-3. In the former, since 10 plus 6 plus 4 or 20 percent of the total weight of the mixture is available to plants, the mixture will cost more per pound, but less will be required than of an 8-5-3, for instance, where only 16 percent of the total weight is plant food. In other words, 80 pounds of a 10-6-4 will supply as much plant food as 100 pounds of an 8-5-3 mixture.

Analysis, therefore, must be considered in determining the actual cost of commercial fertilizers. The material with the highest price per pound may be lowest in actual cost of plant food.

Old Sod Renovation

If a sod is poor, it is best to start over; but worthy sods are remarkably improved by top dressing with a compost of 2 parts good soil and 1 part manure. If the soil in the old sod is sandy, use clayey soil in the compost, or vice versa if the sod soil is clayey. Such topdressing, $\frac{1}{4}$ inch deep, may be applied in spring, midsummer, and fall.

Bare places in an old sod should be raked deeply before sowing, to loosen the soil. The whole lawn then should be top-dressed and thoroughly watered.

Whenever clippings are removed from a lawn they should be composted and later returned as a top dressing. In this way the soil is not impoverished by the removal of its own products.

Most of the weeds found in the young lawn are not at all serious and will not persist after mowing begins. Dandelions, plantain, and undesirable grasses are the most serious persistent weeds in Colorado lawns. To date there is no miraculous and speedy method of eradicating these pests. After the initial "ounce of prevention," hand digging and the pulling off of dandelion blooms with a dandelion rake to prevent formation of more seeds are still the most reliable "pound of cure", though it often assumes more nearly the proportions of a ton.

The presence of obnoxious weeds in the lawn, however, is no cause for discouragement, for "the poor we have always with us." Close inspection of lawns we have always considered fine will reveal a surprising number of weeds. Scrupulous care in maintenance is the secret of fine appearance, and if given this care, your lawn will make a very creditable carpet for your outdoor living-rooms, despite the presence of a few weeds which you intend digging on that elusive day "when there's nothing else to do."