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LAWN MANAGEMENT



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LAWN MANAGEMENT

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AS every lawn presents an individual problem, this leaflet includes a series of lawn management facts based upon experiments, observations, and experience. The reader must select the facts as applied to his own problem and govern his methods accordingly.

All turf grasses are aggressive and grow in successful competition with other vegetation, if given an equal opportunity. Turf failures should never be charged against the grass, if the variety is a real turf grass. Man selects the environment, plants the seed he desires, feeds the grass as he wishes, and abuses it as the occasion demands. It appears, therefore, that man alone is responsible for a large majority of turf failures.

SEVEN factors of equal importance enter into the construction and management of fine turf areas. They are: 1. **The foundation.** 2. **The sub-soil.** 3. **The top-soil.** 4. **Seed selection.** 5. **Seeding.** 6. **Fertilizing.** 7. **General cultural care.** The relation of each factor to the others should be thoroughly understood, as the inter-factor influence is very great. Each has simple fundamental principles that if used correctly will increase the effectiveness of the other factors, but if misused will either bring about complete turf failure or expensive maintenance and unsatisfactory results.

THE FOUNDATION

THE foundation is that soil structure below the sub-soil, and the greater its distance below the top-soil the less is its influence on the turf grasses. A gravel foundation means a complete loss of all water and soluble plant food that reaches it. Drainage from the sub-soil is very rapid and such a foundation can not be expected to furnish the sub-soil with water.

Sand tends to absorb the excess water from the sub-soil, and after the downward flow has ceased will return by capillarity some of the water to the sub-soil. Medium to coarse sand foundations will not retain an excessive amount of water.

Clay absorbs water very slowly and retains it for a considerable length of time and thus permits the sub-soil to become temporarily water logged. A clay strata, especially in the spring season, may also restrict the flow of underground water and cause excessively wet areas, and even flowing surface water.

Hard-pan absorbs water less readily than clay but usually is sloped so that water reaching it runs along its surface to a natural outlet. It is a more desirable foundation than clay.

Rock either rapidly diverts the water to subterranean channels or collects and holds it in an impervious basin. The former means complete loss of water and the latter excessively wet soil, with standing water at times and drowned turf roots.

It should be understood that soluble plant foods can be lost with the water, and in the case of coarse gravel and certain rock foundations even foods in suspension can be lost.

If possible, the foundation of a lawn should be uniform. Otherwise, there will be an unequal distribution of soil moisture and fertility, and uneven heaving and settling. The influence of this unequalness is present in the lawn throughout the year and becomes especially obvious when the rainfall is abnormal.

THE SUB-SOIL

THE sub-soil is that infertile earth between the top-soil and the foundation. It is the regulator of the water flow from the top-soil to the foundation, and as such is fully as important as the top-soil.

The ideal sub-soil should be of such physical condition that it will absorb quickly a large portion of the surplus water from the top-soil and return much of it by capillarity. The depth should be sufficient to retain enough water to supply the grass plant during the normal dry periods between showers.

The depth of sub-soil must vary with the physical character of the foundation within the lawn area, and unless this variation is made the lawn will be uneven in growth especially during the summer months. Over gravel, 14 to 16 inches of sub-soil is necessary, while much less is necessary over fine pressed sand. Clay requires at least 8 inches of fine gravelly sub-soil, or 16 inches of a heavier type of sub-soil. Rock should have 16 to 18 inches of a light clay sub-soil or 6 inches of clay.

Building debris does not make good sub-soil as it is not uniform in its physical characteristics, and will permit rapid flow of water in one area and retard it in another. Small planks, tin cans, and boards stop the upward rise of capillary water and often account for individual browned spots in a lawn. Hard coal ashes, six inches deep over a sand foundation, make an excellent sub-soil.

It should be understood that unless the sub-soil is reasonably uniform in its water-holding capacity and compensates for inequalities in the foundation, there will be a variation in the color, health, and vegetation of the lawn, even though the top-soil is uniform.

TOP-SOIL

TOP-SOIL should be evaluated: (1) by its ability to absorb rain or sprinkled water, retain a reasonable amount, and pass the surplus through to the sub-soil; (2) by its inability to become packed and tight, thus excluding air which is very essential for healthy grass roots, and causing too great a surface run-off of water; (3) by the amount and type of organic matter; (4) by its freedom from infestation with weed seed. Ideal top-soil is friable, reasonably well supplied with plant food, and has good water retention qualities, and at least 5 per cent organic matter.

The depth of the top-soil need not be more than 4 or 5 inches if it is over a suitable sub-soil. And it should be remembered when selecting top-soil that, while a deficiency in plant food may be easily supplied by fertilizers, it is difficult to change the physical texture of the soil once the grass has started to grow.

It is wise to correct any fault in the top-soil before the seed is sown. Correction is best made by spreading the correcting material over the top-soil and mixing it by harrowing. For small areas where the top-soil is carted in, mixing can be done when loading.

The ideal top-soil is sandy loam, and although the heavy and darker top-soils appear to be better for turf growing, they are very liable to become packed and form an impervious roof over the root zone. Clayey soils can be improved physically by the addition of sharp sand, peats (especially American peats) or pulverized charcoal and lime. Sandy soils are benefited by the addition of clayey soil, peats, or other organic matter. It requires much more sand to show

effective improvement to a clayey soil than it does clay or organic matter to a sandy soil. At least $1\frac{1}{2}$ to 2 inches of sand should be spread over a clayey soil before being mixed with the clay.

The value of a soil amendment is influenced as much by the thoroughness in mixing it with the soil as by the material used.

Dark top-soils usually indicate the presence of organic matter which in turn indicates a greater soil bacterial activity. However, dark soil that makes good stiff mud pies when sun or oven dried is not preferred to a light colored soil that makes only a fair pie. Soil that makes a sun-baked mud pie that breaks into a few pieces when struck a sharp blow with a mallet is much less desirable than one that shatters into many pieces. Fertilizers to feed the grass can be supplied to soils of low fertility, and the resultant increase in the growth of grass will add to the organic matter of the soil.

To repeat, the friability of the top-soil is more important than the fertility.

When regrading a lawn, never place top-soil over existing turf without first harrowing, spading, or plowing under the sod.

Harrow or thoroughly loosen the surface of the sub-soil before placing the top-soil. Better results will be obtained if a 2 or 3 inch layer of top-soil is spread over the sub-soil and the two mixed by harrowing. The remainder of the top-soil to be spread as a separate layer.

PREPARATION OF THE SEED BED

THE preparation of the seed bed is best discussed by a series of directions, which if followed should produce a finely pulverized mellow soil for the seed to be imbedded in. Too much stress cannot be given to the fineness of the soil as grass seeds are very small, and to produce plants that will quickly become rooted, the particles of soil must be pressed closely about the seed.

If possible, plow the lawn area before grading in order to loosen and aerate the soil as deeply as possible. Harrow after plowing. If plowing is impossible, spade or fork deeply.

Harrow and cross harrow thoroughly. If the area is too small to harrow, hand cultivate or deeply rake the top-soil. Whatever method is used, loosen the soil to a depth of at least $2\frac{1}{2}$ inches.

Rough rake with iron rakes to remove debris and stones, and roughly grade. Do not attempt to make a finished job. Roll with moderately heavy roller and then, if the harrowing has been well done, loosen with iron rake and finish grade with wooden rake. A second harrowing followed by rolling, loosening, and finish raking is worth while, especially on large lawn areas.

Do all raking up the grade, especially on terraces. Raking down the slope inevitably pulls much of the top-soil to the lower areas where it is not needed, leaving the upper areas thin soiled to dry out quickly and produce thin weedy turf. If peaty material is mixed into the soil on the shoulder of the terrace, or the depth of top-soil increased, much maintenance trouble will be avoided.

If the top-soil is known to be quite acid, a liberal dressing of ground limestone should be incorporated into the soil by one of the harrowings or rakings. As it is more important for the young grass plant to develop roots than tops, the use of high nitrogen-carrying fertilizers before seeding is not advisable. For the average top-soil, only superphosphate at the rate of 30 pounds to 1,000 square feet or a low nitrogen, high phosphorus fertilizer such as bone meal or a 4-12-4 fertilizer should be worked into the soil before seeding.

A convenient method for keeping the correct grade is to have a network of taut strings connecting points known to be at the desired finished grade. As the loosened soil will settle, the finished grade of the new lawn should be from 1½ to 2 inches above the desired final grade. Bordering hard surfaced walks, the finished grade should be 1½ to 2 inches below the walk. Even then, within a few years the grass will be growing over the walk.

As an insurance against damage by the Japanese beetle, which is gradually invading Massachusetts, all new lawn areas should receive from 8 to 10 pounds of arsenate of lead for each 1,000 square feet of area. This should be worked into the top-soil before seeding. This can be done by one of the harrowings or deep rakings. The amount is sufficient to grub-proof the lawn for 3 years. Arsenate of lead is also a preventative against turf injury by the white grub.

Under trees, a pre-seeding fertilizer having a standard 8-6-6 formula should be raked into the soil at the rate of 20 pounds to 1,000 square feet before seeding.

SEED SELECTION

THE Massachusetts seed law requires each package of lawn grass seed to be marked with a label having certain valuable information. Read the label and evaluate the statements before purchasing the seed.

The following may help to explain the labeling.

Purity indicates the amount of true seed of the stated variety or in the case of a mixture the total amount of seed listed.

Germination means the percentage of true seeds that are expected to germinate.

Inert matter is the chaff, sticks, sand, and such debris. It is not harmful, but is useless, therefore expensive to purchase.

Weed seeds are undesirable and should be kept at a minimum. The amount stated should have great influence over the selection of a brand.

Grasses can be classed as *basic*, *special purpose*, *nurse*, or *filler* grasses.

Basic grasses are those which will remain indefinitely in turf if planted in suitable soil and given reasonable care.

Special purpose grasses are those which can be used for special purposes only, such as in shady locations.

Nurse grasses are used to furnish shade for seedlings of the basic grasses; to give a green effect quickly; and to fill in vacancies until the basic grasses develop strong plants.

Filler grasses have no place in a lawn seed mixture and their presence should be carefully noted. They are a detriment to the lawn and will remain not more than two seasons.

A good lawn grass seed mixture should contain seeds of two basic grasses and one nurse grass. The other grass seeds will germinate and temporarily give the appearance of a good turf. The plants however can not tolerate the conditions imposed on fine turf grasses, and will die leaving a thin, weedy lawn. Seed mixtures from reputable concerns are usually satisfactory, and such grass seed should not be charged with the failure or weedy condition of a lawn.

SEEDS COMMONLY FOUND IN LAWN GRASS MIXTURES

Basic	Kentucky bluegrass	Red fescue
	Chewings fescue ¹	German mixed bent
	Colonial bent ³	Velvet bent ²
Special Purpose	Canada bluegrass	Rough-stalked meadow ¹
	Fine-leaved fescue ¹	Seaside bent ²
Nurse	Domestic rye grass	Italian rye grass
	English rye grass	Red top
	Pacey's rye grass	
Fillers	Crested dog's tail	Sheep's fescue
	English bluegrass	Timothy
	Hard fescue	White Clover
	Meadow fescue	Wood meadow
	Orchard grass	

1. Shade enduring grasses. 2. Not suited to average lawn conditions.
3. Colonial bent is the name given to the various strains of *Agnostis tenuis* and may be further identified by naming the source — for example, Oregon colonial bent, Rhode Island colonial bent, etc.

SUGGESTED SEED FORMULAS FOR HOME MIXING

Percentages are by weight and rate of seeding for 1000 square feet.

- For general lawn conditions. Kentucky bluegrass 65 per cent, colonial bent 15 per cent, rye grass 20 per cent. Rate 3 to 4 pounds.
- For a bent grass lawn. Colonial bent 80 per cent, red top 20 per cent, Rate $2\frac{1}{2}$ pounds.
- For a bluegrass lawn. Kentucky bluegrass 75 per cent, red top 10 per cent, English rye grass 15 per cent. Rate 3 to 4 pounds.
- For sandy soils. Chewings fescue 60 per cent, colonial bent 5 per cent, Kentucky bluegrass 10 per cent, rye grass 25 per cent. Rate 4 pounds.
- For shady areas. If shade is from high branched trees or from building shadows, use formula A substituting 15 per cent of rough stalked meadow grass for an equal amount of Kentucky blue. If shade is from low branched trees use Chewings fescue 40 per cent, fine leaved fescue 40 per cent, rough stalked meadow 20 per cent. Rate 5 pounds. If shade is dense, do not expect a lawn; use a ground cover or be satisfied with thickly scattered green tufts by using fine leaved fescue at 8 pounds to 1,000 square feet.

SEEDING

Best time — August 20 to October 15. Second best time — on the snow (if the area is reasonably level) in late February or early March. Third best time — when the ground is in the "honey comb" state from thawing and freezing in the spring, usually in late March.

FALL is the best season of the year in which to seed a new lawn and really no other time should be considered. If the new lawn area is ready for seeding in the spring, either sow a temporary lawn or a cover crop. The latter is much better, if for no other reason than that the temporary lawn may not be turned under in the fall and the area be permitted to become a poor lawn.

If it is necessary to have a temporary lawn, seed it with a mixture of two parts red top and one part timothy, at the rate of 4 pounds to 1,000 square feet. However, it should be understood that this is only a temporary turf, and the lawn area must be plowed, heavily disked, or forked, and regraded and seeded with permanent lawn grass in the fall.

Cover cropping of spring graded lawns is strongly advised. The crops are not offensive, need no care, keep the dust and weeds in check, and when turned under improve the soil. The necessary turning of the soil improves its physical texture.

Two plantings of cover crops are advisable. First, before May 1, spring rye 2 pounds or spring vetch 2 pounds or Canada field pea 3 pounds. Second, to be turned in August 15, soy bean 2 pounds, or buckwheat 2 pounds. With each cover crop use any garden fertilizer at 10 pounds per 1,000 square feet. Cover crops are not bad looking, and will keep dust and weeds under control.

Sow lawn grass seed broadcast by hand or with a mechanical distributor. If sown by hand, an even distribution will be obtained by dividing the seed into four equal parts by bulk. Sow one part north and south, one east and west, and one on each of the two diagonals.

With a mechanical distributor it is best to divide the seed into two parts and sow each part at right angles to the other. After sowing, the seed should be lightly covered by brushing with a brush made of twigs or carefully raked in with a wooden lawn rake. Care should be taken not to cover the seed more than one-fourth of an inch, and the presence of 20 per cent of the seeds on the surface after raking or brushing should cause no worry.

After raking the seed in, roll the area with a light-weight roller. A water ballast roller without water or a wooden roller is advised, but roll it any way whatever the weight of the roller. The soil should be dry, otherwise the roller will pick up the seed and soft soil. Seeding under trees should be done only in the fall. Leaves must be kept raked from the seeded area. It is particularly difficult to grow grass under pine trees, and the grasses most suited for such locations are sheep's fescue, Chewings fescue, and fine-leaved fescue. A mixture of equal parts will produce a turf, but it will be somewhat bumpy.

Newly seeded areas should be kept moist by sprinkling but avoid overwatering and puddling, especially if the soil is "heavy." Many new seedings have been spoiled by permitting the soil to dry out after the grass seeds have started to "swell" or because of a caked condition of the soil. The time between sprinklings and the amount of water applied should be increased as the plants grow.

Young grass plants should be clipped only with a sharp mower or scythe. Make the first clipping when the grass is $\frac{1}{2}$ inch short of "lopping over" and clip not more than 1 inch of the blade, preferably less. The clippings can be left on the areas as they are beneficial.

TURF FERTILIZER FACTS

OF the basic grasses, Kentucky blue is the least tolerant to acid soil conditions, Chewings fescue next, and colonial bent the most tolerant.

Kentucky blue requires the greatest quantity of food, colonial bent a medium amount, and Chewings fescue the least.

The continued use of either acid or alkaline reacting fertilizers, or, in fact, any fertilizer is inadvisable. The best growth by all grasses will be obtained if the soil is kept only moderately acid.

Nurse grasses should not be considered in the fertilizer program.

Neutral fertilizers have no effect upon the acidity or alkalinity of the soil.

Grass plants must have a complete fertilizer, that is, one having nitrogen, phosphorus, and potash, the more important elements frequently deficient in soil.

Nitrogen stimulates leaf growth. The grass plant being periodically clipped must be continuously producing new leaf. It is the most used element.

Phosphorus in abundance encourages clover, but is particularly necessary for the development of the grass roots.

Potash is usually well supplied in the soil, and is important in developing the stem, maturing the plant, and aids in resistance to diseases.

Grass leaves contain the food taken from the soil and will return a large portion if not removed from the lawn after being clipped.

Fertilizer formulas are written as a series of three figures. The first figure states the percentage of nitrogen guaranteed, the second figure the percentage of phosphorus, and the third the percentage of potash.

All fertilizers sold in Massachusetts must be labeled as to their guaranteed nitrogen, phosphorus, and potash. Example: "Rush Em Up Green" brand 10-6-4, interpreted means that this brand guarantees in each 100 pounds of fertilizer 10 pounds of nitrogen, 6 pounds of phosphoric acid, and 4 pounds of potash. Such a brand would be considered as high grade.

Commercial lawn fertilizers should have a descending formula within the ranges 10-6-4 and 7-5-2.

Fertilizers may be classed as either stimulants or tonics.

The different forms of nitrogen commonly found in fertilizer should be understood.

Ammonia and nitrate nitrogen are readily soluble in water and are immediately available to the plant. They are stimulants, caustic, have a short period of effectiveness, and can be easily leached from the soil. Ammonia and urea tend to make the soil acid. Nitrates have a slight tendency toward alkalinity. Stimulants are for prompt effect and depend only upon soil moisture for their availability. Inorganic fertilizers should be worked into the soil by rain or immediate sprinkling if applied heavier than 3 pounds per 1,000 square feet.

Organic nitrogen is the form of nitrogen found in vegetable or animal matter. It is slowly available, non-caustic, and has a long period of effectiveness. It does not change the soil acidity and is particularly desirable for light and gravelly soils. Organic fertilizers must decay before their fertility becomes available, they are therefore dependent upon a reasonably warm temperature in the soil.

Mixed lawn fertilizers should contain a large proportion of organic nitrogen, 50 per cent or more.

No more than 1 pound of nitrogen to 1,000 square feet of turf should be applied at one time. Thus, a 10-6-4 mixture should not be applied heavier than 10 pounds to 1,000 square feet, an 8-6-2 at 12½ pounds, etc.

Bean meals and manures can be considered as complete and well balanced fertilizers having all the nitrogen in organic form. They can be safely applied at 16 to 20 pounds to 1,000 square feet. Dried and pulverized poultry manure can be used at the rate of 20 to 30 pounds.

Fertilizers applied in the spring will help the grass to crowd out summer weeds. Fertilizers applied in the summer cause abnormal growth and strain upon the plants. Fall fertilizer prepares the turf for the winter and results in an early and aggressive growth in the spring.

Lime is not a fertilizer, but a correction for acidity. It also improves the physical condition of clayey soils and aids in creating a favorable medium for the necessary soil bacteria action.

On soils not alkaline or on which acid reacting fertilizers are used, ground limestone should be applied at the rate of 40 pounds to 1,000 square feet every third season. The late fall is the best time to apply lime. Do not apply any fertilizers within 10 days of the lime application.

An ideal fertilizer program calls for three applications; one about April 15 to 20, a second May 15 to 20, and a third September 5 to 10. If only one can be given, there is a slight preference for the September dates.

The May application should be omitted if the lawn is known to be infested with crab grass.

On new lawns seeded before September 1 apply fertilizer at half rate about October 10 to 15; otherwise wait until spring. Areas affected by tree roots should be fertilized in the early fall only.

THE MORE COMMON FERTILIZERS USED ON TURF

Name		Average Analysis	Rate of Application in Pounds To 1,000 sq. ft.
1. Ammonium sulphate	Caustic	21-0-0	3-5
2. Ammo-Phos	Caustic	11-48-0	5-8
3. Cyanamid	Caustic	21-0-0	2-3
4. Urea	Caustic	46-0-0	2-3
5. Calcium nitrate	Caustic	16-0-0	4-6
6. Nitrate of soda	Caustic	16-0-0	4-6
7. Activated sludge	Not Caustic	6-3-0	16-20
8. Blood, dried	Not Caustic	9-0-0	8-10
9. Bone meal	Not Caustic	2½-23-0	25-30
10. Castor bean pomace	Not Caustic	5-2-1	16-20
11. Cottonseed meal	Not Caustic	6½-3½-2	12-16
12. Fish, ground	Not Caustic	9-7-0	8-10
13. Manure (stable)	Not Caustic	1-1½-1	**
14. Manure (poultry)	***	5-3-1	20-30
15. Soy bean meal	Not Caustic	7-2-2	12-15
Non-Nitrogen Carriers			
16. Superphosphate	Not Caustic	0-16-0	15-20
17. Muriate of potash	Caustic	0-0-50	2-3

**Apply at any convenient rate.

***Raw poultry manure will burn the grass, but if it is composted with sand for two or three months there should be no injury to the grass.

Numbers 1-2-3-4-5-6-16 should be washed into the soil immediately after applying.

CONVENIENTLY HOME-MIXED LAWN FERTILIZERS

Ammonium sulphate 20 pounds or calcium nitrate or nitrate of soda 25 pounds and one of the following:

- A. Cottonseed meal 100 pounds and superphosphate 25 pounds.
- B. Castor bean pomace 120 pounds and superphosphate 30 pounds.
- C. Activated sludge 100 pounds and superphosphate 20 pounds and muriate of potash 8 pounds.

D. Bone meal 150 pounds and muriate of potash 8 pounds.

Rate of application per 1,000 square feet of turf area:

Mixture A, 10-15 pounds

Mixture C, 10-15 pounds

Mixture B, 12-16 pounds

Mixture D, 18-22 pounds

Superphosphate may be omitted, but should be included every second year.

On dry knolls and terrace shoulders follow first full rate application at 3 week intervals with a half rate application until July 1.

MOWING AND WATERING

A THICK, well-fed lawn may be clipped closer and more often than one that is thin and underfed. The frequency with which a lawn is mowed should be governed by the length of the grass and the prospective weather rather than by the day of the week.

Lawn turf should be mowed often enough to prevent mats of cut grass showing 36 hours after cutting. If they appear, these mats should be brushed into the lawn area or gathered and thrown away. All other clippings should remain on the turf. The mulch value of clippings has been demonstrated many times.

Set the mower to clip not lower than $1\frac{1}{4}$ inches, preferably $1\frac{1}{2}$ inches and clip when the grass is not more than $2\frac{1}{4}$ to $2\frac{1}{2}$ inches tall. Such a standard height of cut can be constant for the growing season.

If the lawn is not fall fertilized raise the height of cut $\frac{1}{2}$ inch from September 1.

Fifteen to 30 minute sprinklings with the hose are harmful to a lawn, as is a light rain. A thorough soaking once in 6 or 8 days is more beneficial and more economical. Short sprinklings draw the grass roots near the surface where they are very susceptible to wear, drought, freezing, sun, and wind drying. Apply water slowly at first and, if possible, no faster than the soil will absorb it. Grass is not injured by watering while the sun is shining.

SPRING AND FALL CULTURE

COMBING the lawn in the spring with a rounded wire rake, or wooden lawn rake is desirable, but using a wire or rattan broom should be avoided. If the lawn area is rough, the raking should be postponed until after rolling. Spring rolling is very important as it will press the grass crowns that have been lifted by frost action back into the soil. This rolling should be done when the soil is friable but not wet. Much injury will be done if the ground is wet when rolled. Use as light weight roller as is possible to accomplish the smoothing. No rolling is preferred to very heavy rolling, and unless the soil is very sandy, roll only once. Burning a lawn is harmful to the turf.

Turf growing under trees should be kept free from leaves during the fall, winter, and spring in order to permit sunlight and rain to work upon the grass and soil.

The lawn should be cleaned of debris by raking each fall. If the season is late, mowing should continue into October. In Massachusetts the week of September 25 is the usual time for the last mowing. Lawns need no winter protection, and will very likely be severely injured if covered with hay, straw, or similar material.

Any turf area having 40 per cent or more basic grasses should be given an opportunity to be improved by fertilization and correct cultural treatment. Too many lawns that could easily be restored by feeding have been dug up, reseeded (in the spring) without correcting fundamental faults, and treated as carelessly

as before. The result is inevitable; failure to have a good turf, and time and money wasted.

It is wasteful to sow grass seed on a fairly well established lawn, fertilize instead. Bare areas and very thin areas should be deep raked and seeded with the basic grasses predominating in the lawn, otherwise there will be a spot of different color and texture.

ANIMAL AND INSECT PESTS

Ants. The most difficult pest to control. Indicates a sandy soil or subsoil. All stomach poisons, to be effective, must be carried to the queen and grubs, and must be slow enough in effectiveness not to cause alarm among the workers. The time required for such control is usually 2 or 3 weeks. The surest method of control is by the use of carbon disulfide. From an oil can place several drops into each colony and immediately cap the hole with moist earth. If large colonies or "ant hills" appear punch small holes, varying in depth from 6 inches to the bottom of the colony, throughout the infested area and well around the edges. These holes should be from 6 to 9 inches apart. Into each hole pour about 2 tablespoonfuls of carbon bisulphide and immediately seal the hole with moist earth.

Caution — Do not have fire or smoke a pipe, cigar, or cigarette near carbon bisulphide, and do not spill it upon the grass or any vegetation.

Mix one ounce of Paris green into one pound of brown sugar, and apply through a flour screen the amount that passes through with two medium heavy tappings on the screen. Apply at intervals of two steps when the grass is dry. Avoid pre- or post-wetting of the lawn area. If repeated 6 or 8 times during July or August good results should be obtained.

Moles. Moles do not eat grass roots but are very annoying. Trapping is successful if the trigger pan does not press too hard upon the runway. A teaspoonful of calcium cyanide placed in the runways at 5 foot intervals is effective if care is taken not to stop the runs with loose earth. Calcium cyanide is a strong poison and should be treated as such. Attach a hose to the exhaust pipe of an automobile, insert the free end in the center of the mole burrow, and let the automobile run for 20 minutes. Be sure there is a free passage for the gas each side of the insertion.

White Grub and Japanese Beetle. These grubs eat the grass roots just beneath the soil. Their presence is seldom detected until considerable damage is done. The damage appears as irregular patches of dried grass which lifts in a pelt-like mass when pulled and exhibits some of the grubs. The roots being cut, there is no resistance by the grass when pulled. Five pounds of arsenate of lead mixed in two pails full of sand or dry soil and spread on 1,000 square feet of lawn will destroy the grubs. If immediate action is needed increase dosage 1 pound and water heavy to wash lead into the soil.

Should the Japanese or Asiatic beetle be discovered in your neighborhood, your turf areas should be grub proofed by an application of arsenate of lead at the rate of 5 pounds per 1,000 square feet. For greater protection apply 3 pounds the following year.

WEED PESTS

A WELL built lawn, fall seeded with the correct varieties of grass for the location, well fed, and given reasonably good cultural care, will not become weedy. An established lawn that is practically weedfree will continue so if

correctly fertilized and not abused. Many weed-infested lawns can be made practically weed free by the practice of sound cultural methods.

Weeds in turf may be attributed to one or more of the following factors: Spring seeding, particularly late spring; original soil infested with weed seed; weed seed blowing or being washed from adjacent areas; poor grade lawn seed; the use of incorrect fertilizers or no fertilization; the dropping of mature seeds from weeds already in the lawn.

All weeds should be attacked during their weakest period and anti-weed campaigns should be accompanied by fertilization of the grass.

Crab Grass. Fertilize the lawn only in the early spring and after September 1. From June 1 through August 1, cut at a minimum height of 2 inches. Cutting higher would be better. As soon as the crab grass blossoms appear in the fall, place grass catchers on the mowers and destroy the clippings. After the first heavy frost, rake out the crab grass plants and seed in the bare spots and thin areas. The control of this pest on adjacent areas and the diversion of fall and winter surface water that has passed over crab grass infested areas is very important. The use of chemical sprays presents such a practical problem of safety and application that special care must be used and explicit directions obtained.

Dandelion. Digging with a kitchen or asparagus knife is the best way to eliminate this pest when it appears thinly scattered. Be certain to dig deep enough to get at least two-thirds of the root. Badly infested areas are very effectively treated with iron sulphate solution. Dissolve 1½ pounds of iron sulphate into 1 gallon of water and spray with a sprayer that will deliver a fine mist. One gallon of the solution should cover about 350 square feet of surface. To obtain the best results the treatment should be given at the time when the dandelions are coming into bud. A second spraying should be given 10 to 12 days after the first. Iron sulfate will turn the lawn an alarming brownish black color which will last from 6 to 8 days. If the solution is properly applied, no permanent injury will be found upon the grass. The sprayer should be thoroughly washed immediately after using, as the solution is very corrosive.

Pierce each crown with an ice pick and inject a few drops of gasolene.

Ground Ivy, Chickweed, Heal-all, Moneywort. Use 1 ounce sodium chlorate in 1 gallon of water at 10 gallons per 1,000 square feet, or 1 pound arsenic acid in 50 gallons water per 1,000 square feet. There will be some injury to the grass if chemicals are used. Chickweed is frequently eliminated without grass injury by applications of arsenate of lead dusted on dew wet leaves.

Yarrow. Usually enters lawns at time of seeding either in the grass seed or soil. It must be cut out in sods or tolerated. It blends with the grass better and makes a firmer turf than white clover.

Moss. It is a warning of low general soil fertility, a shortage of potash, and often poor drainage. Two or three applications of muriate of potash two weeks apart in the early spring at 4 to 6 pounds to 1,000 square feet will usually kill the moss. Between applications give one dressing with a complete fertilizer.

Quack Grass. It is not necessary to rake or fork every quack grass root from the new lawn area, as quack grass will not withstand the competition of fertilized grass under close and frequent clipping. If quack grass is thick, set the mower knife lower and clip often. As the quack grass becomes coarse and stubby, rake the area and sow a basic grass. Quack grass is sometimes called "witch grass."