March 1965

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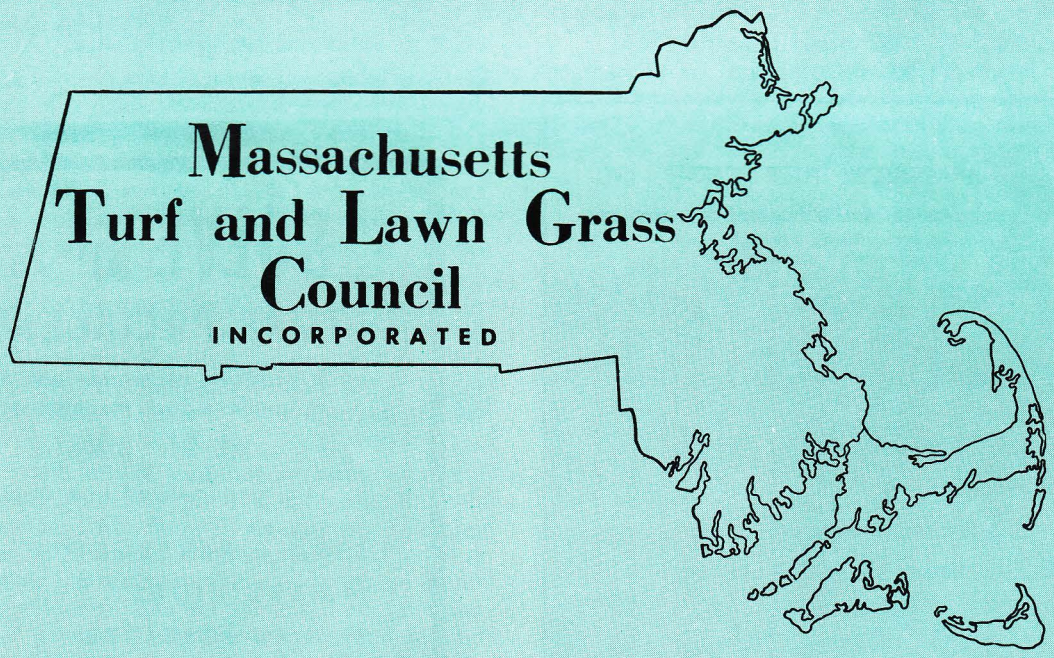
Turf Bulletin



BETTER TURF THROUGH RESEARCH AND EDUCATION

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TURF BULLETIN

Vol. 2, No. 10 **March, 1965**

More detailed information on the subjects discussed here can often be found in bulletins and circulars or may be had through correspondence.

The Golf Construction Scene In New England

by

GEOFFREY S. CORNISH AND WILLIAM G. ROBINSON*

In one of the world's roughest golf countries a dozer pushes out stumps in a jungle of wooded area at the new Stratton Mountain Country Club, Stratton, Vermont.

Mountains are being removed, lakes built, depressions and swamps filled and land cleared of trees and contoured for new golf courses throughout this continent at an unprecedented pace.

New England by no means lags behind the Nation in new courses. For example, in the Hartford-Springfield area no fewer than thirty new courses have opened for play in the last decade or are now under construction. Other New England population centers have enjoyed similar booms.

Even high in the hills of Vermont ski areas, entrepreneurs are constructing courses that will rival the Nation's most elaborate layouts. Mt. Snow is engaged in a golf construction program with Frank Lamphier, Stockbridge '54 as superintendent, that will end with 45 holes. At nearby Stratton Mountain 9 bulldozers, 2 power shovels, 3 wagon drills, 7 dump trucks, 2 payloaders and 50 men worked around the clock last summer carving the new Stratton Mountain Club out of forest and rock ledge. And in addition new courses many established New England clubs are involved in major changes.

MODERN DESIGN

Golf design is changing. During the boom of the Twenties a few names such as Donald Ross, Stanley Thompson and Allister McKenzie dominated the field of golf architecture. Today there are at least 60 golf architects on this continent engaged full time in course design. Most of today's architects are graduate agronomists and landscape architects and many were formerly associated with one of the three renowned golf designers of yesteryear.

Some courses built before World War II occupied as little as 100 acres. The modern eighteen requires more. Today's golfer is no wilder than his father but there are more of them. This necessitates more space between fairways and wider buffer zones along property boundaries. A huge practice fairway is also considered a must.

While many golfers enjoy playing a relatively short layout all new courses need longer yardage for tournaments and for visiting professionals. Therefore all new regulation courses have a minimum championship yardage of 6600. But with multiple and long tees the course can be played by the ladies at 5800 to 6100 yards with men's regular yardage at 6100 to 6500.

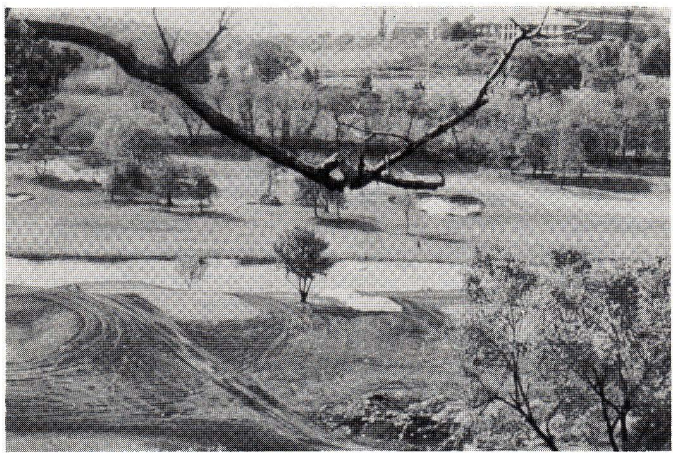
There is also a healthy development in par 3 courses which golfers, even country club members, prefer to play occasionally for a change in pace. In between regulation and par 3 courses there are others of varying lengths, although not regulation but which bring pleasure to thousands and introduce many to the game.

Much has been written about whether a course should be designed for the low or the high handicap player. The truth is that with long or multiple tees, judicious placement of hazards, alternate routes for different players and with large greens a layout can be a true test for the low handicap man and yet not be too difficult for the less experienced.

Modern design favors the high handicap man at the expense of his more experienced opponent. This is rough on the professional and low handicap amateur, but it appears to be in the best interests of the majority. Club professionals and low handicap amateurs are sportsmen and

Many established clubs are engaged in major renovations. The new 15th green at Webhannet, Kennebunk, Maine built under direction of Superintendent Ernie Brown, 1965 Winter School has been painted by a leading artist with the original now in the home of steel executive Mr. Leslie Edgcomb.

(Continued Col. 1, Page 4)



There is a healthy development in Par 3 courses that call for almost every club in the bag. Scene during seeding at Powder Horn 18 hole Par 3 in Lexington, owned by William Potter, Winter School 1965, and his brothers.

GOLF N. E.—*Continued from Page 3*

gentlemen about this modern trend in design. Several touring professionals are not, however, always generous towards factors which force their scores upward.

THE GOLF COURSE SUPERINTENDENT

It is not surprising that superintendents at most New England courses are products of the University of Massachusetts Winter and two-year Turf Course. In addition, you will find graduates of these two schools maintaining courses all over the Western Hemisphere. Superintendents from nearly every State and Province of Canada have attended the Winter School. Started by Professor Lawrence S. Dickinson in 1926, the school now headed by Professor Joseph Troll has increased its enrollment almost four times in his tenure. All golf architects agree it is the superintendent who ensures the enduring greatness of any layout. No one should deny the significant part of the Turf School at the University of Massachusetts has played in the golf and turf world.

GRASSES FOR NEW ENGLAND

PENNCROSS, the most widely used grass on new putting greens in recent years, now has to look to its laurels. The new seeded *VELVET BENT* developed by the University of Rhode Island looks very promising. *MERION (KENTUCKY) BLUEGRASS* still dominates the picture on New England tees. For fairways *MERION* has produced the most beautiful, impressive and wear resistant turf. Unfortunately, golfers object to its density as it becomes older claiming there is little roll on a *MERION* fairway thus adding too much playing length to the course. They claim also that *MERION* blades get between club face and ball to minimize control. Nevertheless with its superior qualities *MERION* will be used for many years on fairways despite the trend back to *BENTGRASSES*.

The experience of all golf architects shows the American golfer is no longer content with the passable. He craves the outstanding and is willing to pay for perfection in both design and playing conditions. This is as true of the fee type golfer and non-equity member as it is at exclusive member owned country clubs. The future does indeed look bright for the young superintendent who will dedicate himself to perfection.

***William G. Robinson recently joined the staff of Geoffrey S. Cornish, golf course architect of Amherst. Mr. Robinson is a graduate in landscape architecture from Penn State University where for three years he was on the golf team that won the Eastern Universities Championship. Before joining Mr. Cornish he worked for golf course architect Robert Trent Jones of New York and the landscape architectural firm of Community Planning Services Inc. of Pittsburgh. From early youth he has prepared himself for the profession of golf course architecture.**

Mr. Cornish and Mr. Robinson are working on twelve new courses and the redesign of an equal number of old established clubs. Their most distant course from Amherst is Shaughnessy Country Club on the Pacific in Vancouver, B. C. and their nearest the new Municipal court in Chicopee.

A Bunyan Size Checkerboard?

This giant checkerboard is located right on the ninth green at the Wahconah Country Club, and within the next few days there will be another one on the first green. The white checks are made by ice and snow, and the brown ones are a calcined clay material, designed to check the winter damage to the greens, which can run into thousands of dollars in one winter. The material, which is being used as an experiment, was placed in the checkerboard design for a comparison next summer. The man in the picture is Edward Fletcher, course foreman, who installed the new material last Wednesday with Roland Armacost, greens superintendent at Wahconah. The material, which bears the trade name "Terra Green", was donated to the course through the University of Massachusetts by two companies, the Oil Dri Corp. of America and the Hubbard Hall Chemical Corp. Mr. Armacost pointed out that greens sod on many courses are frequently heavily damaged.

Grass Seed Testing In Massachusetts

WILLIAM N. RICE
Director of the Seed Laboratory
University of Massachusetts

The Massachusetts Seed Laboratory is located in Amherst on the University campus and is housed in the West Experiment Station building (Lindsey Laboratory). It is a part of the Department of Feed, Fertilizer, Dairy Laws and Seed Laboratory and is administered by the Director of the Agricultural Experiment Station.

The Seed Laboratory has several functions fulfilling the purposes of the Massachusetts Seed Act:

1. To determine the quality of seeds being sold in Massachusetts which have been sampled under the direction of the commissioner of agriculture.
2. To inform the commissioner of any seeds being sold in violation of the Seed Act.
3. To publish the results of the official tests so as to inform the public, and by so doing deter the entrance of poor quality seed into the Commonwealth.
4. To determine the quality of seeds which residents of the Commonwealth may submit for their own information.
5. The laboratory also cooperates with the Federal Government and other States in Seed Law enforcement work, and in the development of seed testing techniques and rules for seed testing.
6. The laboratory provides information and advice for individuals and students seeking or requesting aid concerning seed technology problems.

Changes in Seed Law Contemplated

In keeping with one of the functions of the laboratory, changes in the rules and regulations for seed testing are occasionally suggested. Before any changes are made in the rules and regulations, however, there must be a public hearing.

Three changes are proposed involving grass seed: the first involves labeling of grass seed mixtures to conform with the heading "Fine Textured Grass" and "Coarse Kinds". Under these headings the accepted kind names with germination and purity are required as before in tabular form. This suggested change should help the consumer in choosing or evaluating a mixture as it would point out the fine textured and coarse kinds.

The second proposal would limit the amount of inert material in grass mixtures to 20%. This would help to keep extra dirty or chaffy seed from the market.

The third proposal would treat redtop the same as bentgrass and white clover in labeling of mixtures. This would bring the law into line with the thinking of turf people who generally agree that redtop, if used in lawn or turf seed, should constitute only 5% or less of the mixture. This would permit seedsmen to label this component as one of the constituents of the pure seed when it is less than 5% of the mixture.

Another proposal would consider *Trifolium procumbens* (large hop clover) as a weed in Massachusetts. This seems reasonable because *Trifolium dubium* (suckling clover or small hop clover), a similar plant, is already included as a weed.

Certain changes in the germination standards for vegetable seed are also contemplated, which will make the standards more uniform with the Federal Seed Act.

Noxious Weed Seeds For Grasses

At the annual meeting of the Association of Seed Control Officials of the Northeastern States held in Amherst from August 31 to September 2, 1964, considerable thought was given to a noxious weed list for grass. This list was prepared by turf and lawn grass experts and contains the names of weeds which present problems in lawn and turf.

It is thought that some of the weeds mentioned are disseminated through grass seed as well as being spread by other means. The list presented for study includes:

SUMMARY OF NOXIOUS WEED SEED LIST
RECOMMENDATIONS FOR LAWN SEED

Region No. 3
New York, Pennsylvania, New England States

	Prohibited	Restricted
Field bindweed	X	
Quackgrass	X	
Canada thistle	X	
Johnsongrass	X	
Sorghum almum	X	
Bedstraw	X	
Russian knapweed	X	
Leafy spurge	X	
Carolina horsenettle	X	
Yellow nutgrass	X	
Purple nutgrass	X	
Bermudagrass	X	
Red sorrel	X	
Velvetgrass	X	
Wild garlic		X
Wild onion		X
Orchardgrass		X
Nimblewill		X
Bentgrass		X
Timothy		X
Redtop		X
Tall fescue		X
Yarrow		X
Woodsorrel		X
Other Weeds mentioned:		
Barnyardgrass	X	
Annual bluegrass	X	
Woundwort (*Stachys polustris*)	X	
Dodder		X
Corncockle		X
Buckhorn plantain		X
Yellow rocket		X
Mustard		X
Wild radish		X
Perennial sowthistle		X
Mouse-ear chickweed		X
Knawel		X

The list is now to be reviewed by seedsmen, seed laboratories and seed control officials with the hope of arriving with a list of plant names, the seeds of which would be recommended as noxious weed seeds for lawn seed.

SIX YEAR SUMMARY OF SEED LAW VIOLATIONS

Looking through the records of the Seed Laboratory it is seen that of all the seeds brought in for testing, the grass seed mixtures continue to show the highest number of violations.

	Turf and Field Crops		Turf Mixtures		Vegetables		Flowers		Totals	
Year	No. Samples	% Violations	No. Samples	% Violations	No. Samples	% Violations	No. Samples	% Violations	No. Samples	% Violations
1958	297	11.8	88	56.8	491	2.2	373	28.9	1249	16.3
1959	302	12.3	68	45.6	457	1.8	296	12.8	1123	10.2
1960	59	3.4	42	50.0	421	3.8	301	25.9	823	14.2
1961	219	12.8	77	61.0	402	20.0	315	14.0	1013	19.6
1962	160	16.3	73	50.7	301	18.3	260	7.7	794	17.4
1963	89	5.9	59	44.1	388	9.3	333	9.6	903	11.6

Seeds of turf mixtures including lawn grasses showed 44.1% mislabeled seeds in the 1963 season. Of these 22.4% were purity violations and 13.7% were other serious violations such as germination, weed content, misleading labels or wrong variety statements. 8% were of a minor nature such as: test dates, lot number and treatment statements.

It is thought that, by far, most seedsmen are honest and want to sell high quality seeds. Furthermore, it is suggested that the quality of grass seed could be improved if seedsmen were more careful with the blending and packaging of seeds, and if they would make out the label statements more accurately with the full information required.

The results of the 1964 seed inspection will be published in early 1965 and copies of the report will be available to those who desire it.

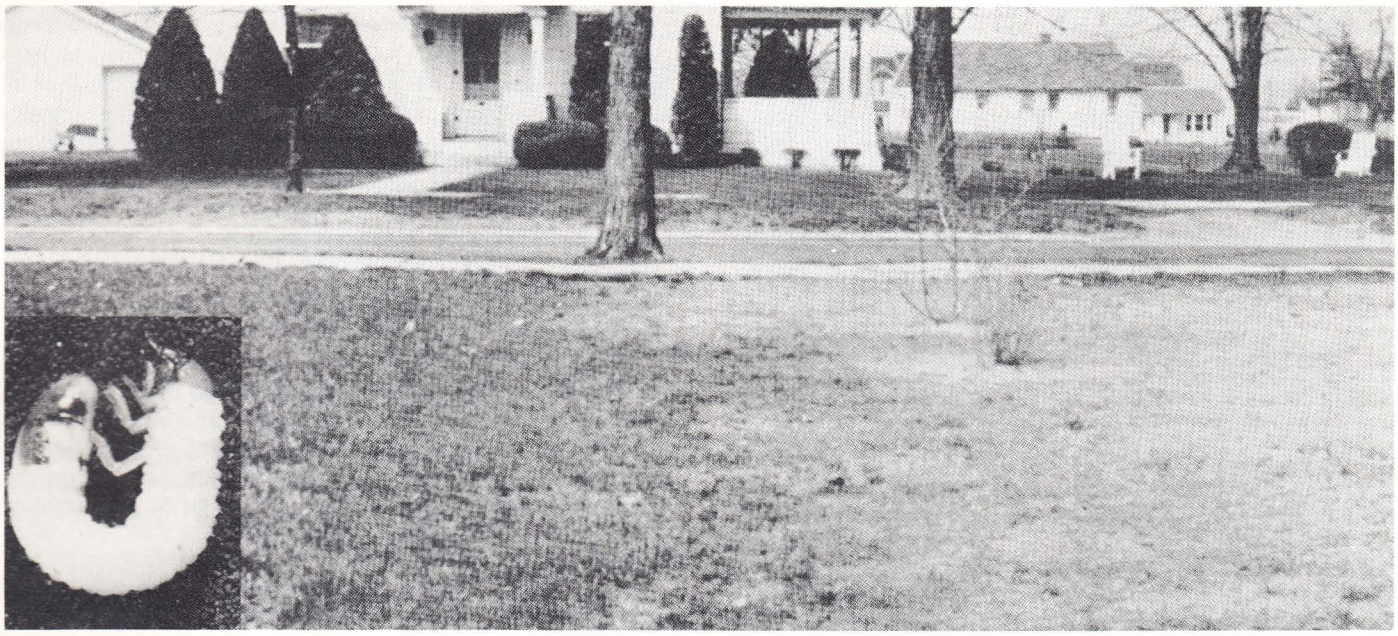


Fig. 1.—Severe injury to turf by European Chafer. Insert shows C-shaped mature grub.

European Chafer as a Turf Problem

by **F. L. GAMBRELL,** ***Department of Entomology, Geneva***

THE European chafer has caused damage to the lawns of numerous home owners in New York during the past 25 years. This has been especially true in the central and western parts of the State.

It was first detected as a pest in this country during 1940 in Wayne County. Distribution at first appeared to be limited in nature, however, serious injury to grass was observed at that time and the species was considered to be a pest of potential importance on turf. Since 1940, there has been a gradual but natural spread from the periphery of the original infestation by flights of the adults. Also, some extensions of the original infestation probably occurred through the movement of grubs in soil of plant materials, top soil and fill materials prior to the development of satisfactory control and regulatory procedures.

In some sections of the State, the problem is complicated by the presence of other related species of grubs such as the Japanese beetle, Asiatic garden beetle, oriental beetle, northern masked chafer, and native species of white grubs which also feed on the roots of grass and cause similar damage to turf. Fortunately, for purposes of control, the identity of the different species of grubs is not too important since all of them can be controlled with one of a number of insecticides when applied in the soil. However, there are peculiar differences in the habits of the European chafer adults and other species which would be important to know in their control.

Life History and Habits

The European chafer has a one-year life cycle. The grub stage lives in the soil for a period of 10 to 11 months—from July until the following June. During the summer and fall months the grubs are very active and feed upon the roots of various grasses, weeds, and other plants.

They grow rapidly and reach ¾–1 inch in length by late fall. The grubs remain in the soil over winter, but are inactive at temperatures near the freezing point. Early in the spring the grubs resume their feeding until about mid-May or early June. Then, pupation occurs and within 2–3 weeks the adults begin to emerge. The adults or beetles are light tan to brown in color and are about ½ inch long. They emerge from the soil between sunset and dark on warm, dry evenings during June and July. They tend to fly toward some object, tree, or shrub, and swarm around until almost dark. While in flight, the adult, or beetle, makes a buzzing-type noise, tends to congregate around trees, and may be mistaken for a swarm of honeybees.

They usually settle down about dusk on the foliage or branches of trees and shrubs, mate, remain there overnight, and return to the soil about daylight the following morning. The beetles are not harmful to either man or plants. Each female may deposit from 30 to 50 eggs, singly, in the soil. Eggs hatch in from 2 to 3 weeks, depending upon the soil temperature, and the young larvae or grubs begin feeding upon the soil, roots of grasses, and other plants.

Control of Grubs

Damage to grass can be prevented and the grubs can be killed by applying the proper amount of a suitable

insecticide at the correct time of the year. Application can be made at any time of the year, but from a practical standpoint, either early spring or late summer is preferred. If possible, treatment should be made immediately before a rain or, it should be washed in thoroughly with water from a garden hose. This practice serves a dual purpose of removing excessive residue from

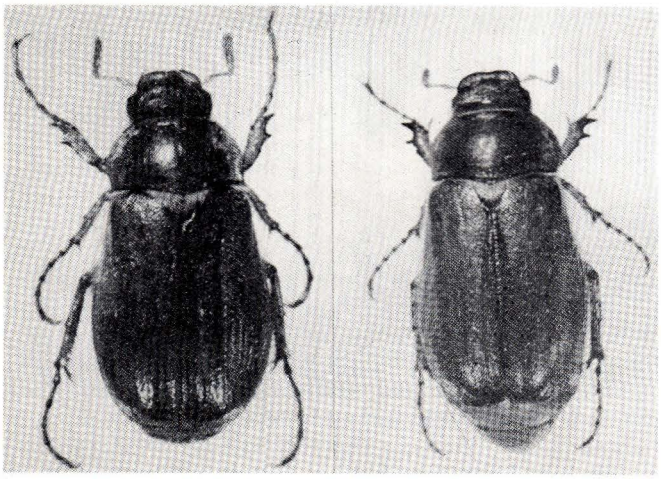


Fig. 2.—Photograph of male (A) and female (B) beetles showing variation in shape and size of the adults.

the grass, and also aids in washing the insecticide into the soil. Repeated freezing and thawing of the soil surface should also aid in getting the chemical into the soil. It should be noted that the insecticide is most effective against young grubs and also when soil temperatures are near or in excess of 70° F. At lower temperatures, during late fall or early spring, it takes many weeks to kill third-instar grubs.

Experiments have shown that such materials as aldrin, dieldrin, chlordane, and heptachlor are quite effective against the grubs and possess persistent residue properties. A single application of any one of these materials at the recommended rate should grub-proof a lawn for several years. Several weeks, even at summer temperatures, will be required to kill the grub stages. Some of the affected grubs may eventually crawl to the surface of the grass before they are killed. The rate of kill is related to dosage level and soil temperature, but a minimum of several weeks at 70° F. is necessary for complete control.

Since there are different chemicals, formulations, and rates of application, it is impossible to suggest one rate or method of application that would meet all conditions. However, in general it may be said that dry formulations such as dusts or granular mixtures can be applied with regular lawn seeder or top-dressing equipment. Each machine will need to be calibrated to deliver the correct amount of a given formulation on a specified area of, say, 1,000 square feet. The same is true when using either wettable powders or emulsifiable mixtures in water. In some instances, garden stores or other sales groups may have available equipment and insecticide formulations with suggested settings to obtain specified rates of application. Insecticide-fertilizer mixtures are also available, if preferred.

Satisfactory grub control in lawns and flower gardens is based upon the use of either aldrin, dieldrin, or heptachlor at the rate of 3 pounds per acre, or chlordane at 10 pounds per acre, of the actual chemical. The amount of the formulated material used will depend upon the percent of the active ingredient in the mixture.

Materials and Rates of Application

The insecticides recommended for control are offered in a number of different formulations. It is neither possible to give a complete list of all of them here nor to indicate the rate at which they are to be used. However, the following table does list some of the common types of formulations that are available and suggests the rate of application for those particular concentrations. Others will need to be diluted on the basis of the active ingredients in the mixture.

Materials (Use one only)	Amount per 1,000 square feet of lawn
Fertilizer mixtures including, Aldrin, chlordane, dieldrin, heptachlor	**Concentrations vary in active ingredients. Use at rate recommended on the label.**
Dusts	
5% aldrin, dieldrin, heptachlor	1½ pounds
5% chlordane	5 pounds
Wettable Powders	
25% aldrin, heptachlor	4½ ounces (in 20 gal. of water)
40% chlordane	10 ounces (in 20 gal. of water)
50% dieldrin	2¼ ounces (in 20 gal. of water)
Liquid Emulsifiable Concentrates	
24.5% aldrin (contains 2 lbs./gal.)	4½ flu. oz.[1] (in 20 gal. of water)
75% chlordane (contains 8 lbs./gal.)	3¾ flu. oz. (in 20 gal. of water)
18.6% dieldrin (contains 1.5 lbs./gal.)	6 flu. oz. (in 20 gal. of water)
2E heptachlor (contains 2 lbs./gal.)	4½ flu. oz. (in 20 gal. of water)

[1] 2 tablespoonsful=1 fluid ounce.

Precautions in Grub-Proofing Your Lawn

1. Read directions on package carefully and follow recommendations.
2. Remove all lawn furniture, toys, receptacles for feeding pets, dog bones, or other objects before applying insecticide.
3. Dilute insecticide and apply evenly and uniformly as directed on container.
4. Water insecticide in well after treating the lawn. This serves a dual purpose of removing pesticide residues from foliage and also washes it onto the soil around the plants.
5. Keep children and pets off treated areas, insofar as possible, for 1 to 2 days after treatment.
6. Avoid inhaling materials or direct contact with them.
7. Annual treatment is not necessary. If applied according to recommendations, treatment should last at least 3 to 5 years.
8. Milky spore disease is not recommended for control of European chafer.

Reprinted from *Farm Research 1964*

Unified Conservation Planning

by

BENJAMIN ISGUR

State Conservationist, Amherst, Mass.

New legislation in Massachusetts unifying all resource conservation efforts under the direction of a single State agency is bringing rural and urban people together as never before in meeting the growing problems of urbanization.

The State's unique conservation setup makes soil conservation districts — now called simply "conservation districts" — responsible for providing "one stop" technical service in all phases of resource conservation and land use planning.

Conservation Commission

In addition to conservation districts, cities and towns have their own "conservation commissions" responsible for taking the leadership in urban conservation programs. The commissions recommend conservation measures to be included by town planning boards in "master plans" for land use. They obtain technical services, such as soil surveys and interpretations, from the districts.

In Massachusetts, "towns" include rural as well as urban areas and are generally equivalent to townsships in many other States. To date more than 200 town conservation commissions have been established within the 15 reorganized conservation districts that cover the entire State.

Both the districts and commissions are under the administration of the State Department of Natural Resources. A new Conservation Services Division in the department channels technical assistance to the districts and commissions.

The resulting organization of resource agencies in the State assures that every new school, park, shopping center, housing subdivision — in short every conceivable community facility — may have the entihe range of conservation thinking and skills applied directly to its location, development, and protection.

District Experience

The salvage of valuable New England farmland and the designation of conservation areas dedicated to wildlife, nature trails, and open space in urban areas are also encouraged, as evidenced by scores of requests for technical assistance already received from expanding towns and villages.

Because citizens had become concerned over the increasing loss of natural resources to mushrooming housing developments, industrial sites, and the like, the Massachusetts General Court in 1957 passed the Town Conservation Commission Act enabling cities and towns to set up "Conservation Commissions" as functional units of community government.

These commissions are empowered to operate municipal conservation programs and to perpetuate adequate open space. They have funds to purchase land and acquire easements. For the first time, direct lines of communication were opened between all the community governing bodies and the complete range of State, Federal, and local agencies ministering to conservation needs of both rural and urban land.

A Broadened Role

Meantime soil conservation districts had gained considerable experience in answering requests for advice on urban conservation problems. In the past two decades many a hard-pressed town selectman, mayor, or city manager had found the district supervisors and the technical people of the Soil Conservation Service a prime source of aid in coping with perplexing soil and water problems or in making land use and zoning decisions. Supervisors and soil conservationists, however, had grown increasingly frustrated with what was obviously a piecemeal mode of giving aid to communities.

The General Court in August 1963 amended the Soil Conservation Districts Act to broaden the role of soil and water conservation districts. It dropped the words "soil and water" from the names of the districts and placed them under the supervision of the State Department of Natural Resources already encompassing all other resource agencies within the State.

The former State Soil Conservation Committee became the "State Committee for the Conservation of Soil, Water, and Related Resources" and was enlarged to include the Commissioner of Agriculture, the chairman of the Water Resources Commission (who is also the Commissioner of Natural Resources) and the dean of the College of Agriculture. The new State Committee also includes a representative from the Massachusetts Association of Conservation Districts, the Massachusetts Association of Town Conservation Commissions, the Massachusetts State Grange, and the Massachusetts Farm Bureau. The SCS State conservationist is an advisory member.

In the language of the act, the responsibilities of conservation districts were amended to include . . . "ocean, shellfish, and inland fisheries; wild birds, including song and insectivorous birds; wild mammals and game; sea and fresh water fish of every description; forests and all uncultivated flora together with public shade and ornamental trees and shrubs; land, soil, and soil resources, lakes, ponds, streams, coastal, underground, and surface waters; mineral and natural deposits."

In effect, the General Court gave conservation districts *carte-blanche* to become "one stop" headquarters for resource-guiding assistance.

Technical Services

To insure that the many specialists required for such a broad program would be readily available the new legislative established a Division of Conservation Services in the State Department of Natural Resources. The unit serves both as a clearing house and as a communications traffic manager for requests for technical information and services. The mechanism operates to assure that resource specialist teams drawn from one or several agencies are alerted to opportunities to be of service to local jurisdictions on natural resource problems.

Conservation districts understand the advantages of the resource team approach in community conservation planning. Although little time has elapsed since the legislation was passed, several districts have acted to use their new authorities in carrying greater assistance to towns and cities undergoing the growth-pains of expansion.

One of the pioneering efforts at complete conservation planning took the form of direct action in 1961 at the Town of Hanover, a quaint, former shipbuilding community on the route from Boston to Cape Cod.

(Continued on Next Page)

Worried about future growth and wanting to preserve the rural values that had attracted many of its residents, citizens of the town wanted to preserve open spaces, both for recreation and for conservation reasons. The town planning body readily grasped the opportunity offered by the supervisors of the Plymouth Conservation District to evaluate the community's soil and water potentials for natural resource development. The resulting pilot project paved the way for a significant alliance between planning consultants, the Town Conservation Commission, and SCS soil scientists.

The Hanover Report

Already well along with a survey of the entire county, the SCS extended soils mapping to complete a detailed investigation of Hanover's entire area of 10,000 acres. Further, the soils men provided interpretive information indicating suitability and limitations of each acre for the full gamut of town needs, including septic tank disposal areas, homesites, athletic fields, wetland for wildlife, sources of sand and gravel, roads, woodland agriculture, and surface runoff disposal.

In accepting the conservation district's contribution toward preparation of Hanover's Master Plan, professional consultants cited the scientific "authority" of the SCS data. Soils maps and interpretations were recognized as excellent guides for decisions about road layouts, drainage, subdivision regulations, and building codes.

Published in two volumes by the Massachusetts Department of Commerce and distributed widely by the U. S. Department of Agriculture the "Hanover Report" drew attention from civic and resource agency officials throughout the United States and in several foreign countries. Inquiries from conservationists and planning interests for supplementary information were numerous.

Many Massachusetts town and village officials were prompted to apply to their own district headquarters for soils inventories and maps "like those in the Hanover Report." Furthermore, they proved willing to share in the costs of making the surveys and producing the interpretive materials. This tangible support served to amplify the districts' ordinarily limited manpower and the service was thereby accelerated.

Survey and interpretation assistance has, to date, been furnished to 14 towns, and 12 others have contracted for reports now under development. Two multitown regional areas have also contracted for more generalized surveys, and several communities where swift urbanization is expected have asked for detailed data. Thirty-six other towns are awaiting their turn. For this and associated work, the entire SCS soil survey staff in Massachusetts is scheduled into 1966.

At the heart of the current movement is a "natural resources evaluation" procedure which many communities follow in preparing their master plans. The conservation districts provide the technical information for the resource inventory. Steering committees representing town-wide governmental interests prepare lists of community objectives on water supplies, population, economy, and other factors that affect their future.

Resource teams provided through the district then work with the planners to insure that no interrelationships, no alternative sites, and no optional land uses are overlooked. The culmination of such an approach results in more tangible and realistic master plans. *(Soil Conservation, Vol. XXX, No. 2)*

Uptake Of Chlorides By Sugar Maples From Rock Salt Used For Highway Ice Control

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Division of Research Development
Connecticut State Highway Department
Laboratory, Portland

Public safety demands that our highways be kept in an ice-free condition throughout the difficult winter months. The use of sodium and calcium chloride has been found effective and economical for this purpose.[1] Unfortunately, these salts have an herbicidal effect on plants; and plants have a greatly varying sensitivity to the chloride salts. As the total amount of ice-control salting has been increased, injury to some tree species along highway right-of-ways has become apparent during the past four moisture-deficient years. No doubt, age of tree, specie, disease, moisture-stress, changes in water table, mechanical injury, soil conditions, nutrient status, and factors other than the application of ice-control salts play an important role in tree health. It has been apparent, however, that the number of trees dead or dying along right-of-ways has increased with a higher proportion of the affected species being other than elm.

The rapid decline of sugar maples planted in 1896 along the east and west side of Route 17, south of Middletown, appear to be coincident with the increased use of rock salt for ice control on the highway pavement. Trees on the west side of the route exhibited severe leaf margin burn, some limb die-back. Four trees were severely defoliated in 1964. Drainage from the pavement tended to collect at the base of these trees. Trees on the east side were located on a low out-slope four to six feet above the pavement. None of the east side trees exhibited leaf margin burn, or signs of general decline.

Information on tolerated chloride levels; or salt sensitivity of shade trees is not extensive. Literature search[2] indicates that salt sensitive species will probably display leaf margin burn when the chloride levels approach 0.5% of the total dry weight of the leaf tissue; and that the lethal leaf tissue dosage for the affected limb or tree is probably 1%. Lacasse and Rich[3] working with roadside trees in New Hampshire found higher than normal sodium levels in the twigs and leaves; and higher than normal soluble salts in the sap of sugar maples growing within the windrow of plowed snow.

Investigation in August, 1964 of the sugar maples along Route 17 in Connecticut indicates higher than normal levels of chlorides in leaf and twig tissue of the normal-appearing trees on the east side of the highway as compared to the chloride levels found in the leaves and twigs of three control trees selected from a hill site not exposed to highway deicing operations.

The leaf and twig chloride levels of the trees displaying severe leaf margin burn (west side of Route 17) were decidedly higher than the chloride levels found in the east side trees or the control trees. Three of the four trees suffring defoliation had relatively low leaf chloride levels; but the twig chloride levels would lead one to speculate that these trees received a near lethal dosage probably in a previous season; and being in a very low metabolic state did not translocate as much sap, or chlorides, during the 1964 season as the other trees. A fourth defoliated tree with a leaf chloride content of over 0.7% (7132 ppm) was dead by December.

Sugar maples on the west (left) side display leaf margin burn, limb die-back, and varying degrees of defoliation. Trees on the east side growing on a cut-slope appear normal and healthy. Photo taken in August 1964.

TABLE 1
West Side Trees, Physical Data

Tree	dbh (inches)	Lateral Distance from Pavement (feet)	Elevation in Respect to Pavement (feet)
W1	24	6	L
W2	24	8	L
W3	24	2	2, above
W4	28	T	2, above
W5	24	T	L
W6	24	2	2, above
W7	30	3	L
W8	36	3	L
W9	24	3	L
W10	24	1	L

T – tree touches pavement edge; L– — base of tree level with road pavement; trees on this site subjected to pavement drainage from the south, and accumulated on the west side of the pavement. Natural outlet for drainage is a low marshy area, west of the highway.

TABLE 2

Tree	Amount of Foliage Showing Leaf Margin Burn (%)	Leaf Tissue Chlorides p.p.m.	Twig Tissue Chlorides p.p.m.
W1	100	9304	683
W2	80 d, x	2848	330
W3	90	9257	1114
W4	95	9399	1322
W5	100	8030	899
W6	100	6053	647
W7	100 d, x	2719	756
W8	50	8185	910
W9	100 d, x	2621	289
W10*	100 d, x	7132	774

d – marked degre of defoliation during growing season of 1964

x – some limb die-back during 1964

* – Informed by District Engineer on December 7, 1964 that this tree is dead and must be removed since it constitutes a hazard to highway users.

TABLE 3

Control Trees Selected from a Site on a Hill and Not Exposed to Salt Contamination from Highways

Tree	dbh (inches)	Visible Leaf Injury (%)	Leaf Tissue Chlorides p.p.m.	Twig Tissue Chlorides p.p.m.
C1	24	0	960	63
C2	30	0	1441	31
C3	30	0	1009	47

Owner says he has not fertilized site of these trees in several years; but area is a pasture. Trees are tapped for syrup every year. Property of Oliver Scranton, Guilford, Connecticut.

TABLE 4

East Side Trees, Physical Data

Tree	dbh (inches)	Lateral Distance from Pavement (feet)	Elevation in Respect to Pavement (feet)
E11	15	8	6, above
E12	24	6	6, above
E13	24	6	3 "
E14	24	6	4 "
E15	26	6	4 "
E16	24	6	4 "
E17	24	6	4 "
E18	24	4	4 "
E19	24	6	6 "
E19	24	6	6 "
E20	28	6	6 "

Trees on this site subjected to drainage from the east, and toward the highway. Natural pattern of runoff is westerly to the low, marshy area west of the highway.

TABLE 5

East Side Trees, Visible Injury and Tissue Chlorides

Tree	Amount of Foliage Showing Leaf Margin Burn (%)	Leaf Tissue Chlorides p.p.m.	Twig Tissue Chlorides p.p.m.
E11	0	1074	112
E12	0	1648	271
E13	0	1660	79
E14	0	250	48
E15	10*	1232	81
E16	0	362	125
E17	0	2046	129
E18	50*	1851	226
E19	0	3126	284
E20	0	2196	235

* No leaf margin burn was observed on the trees on this site; two leaves demonstrated yellow cast leaves.

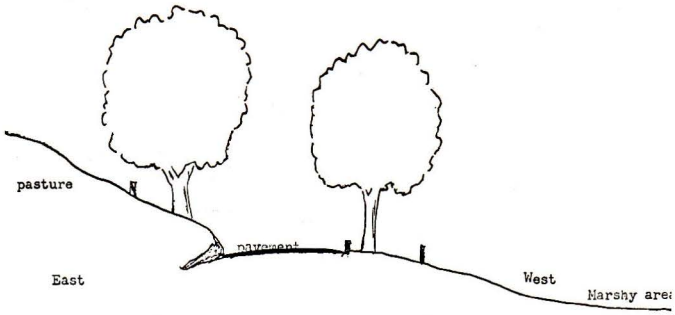
TABLE 6

Precipitation, Middletown, Connecticut (inches)

Year	March	April	May	June	Sum	Annual
1959	5.19	5.12	1.62	5.82	17.76	51.62
1960	3.84	2.96	2.70	2.63	12.13	51.06
1961	3.85	6.82	5.13	2.35	18.15	47.07
1962	1.79	3.79	1.11	6.37	13.06	41.11
1963	3.83	0.85	3.85	3.45	11.98	42.18
1964	2.91	5.68	1.85	1.56	5.23	

U. S. D. Commerce, Climatological Data, New England 1961-1963 Total deficit 20.74 inches

Figure 1
Cross-section of Test Site
(looking southward)



Cross-section of Test Site
(looking southward)

Topography of site is such that highway grade is generally uphill towards the south. Land adjacent to the highway drains in a northwesterly direction. Pavement drainage accumulates from the south for perhaps a half-mile before slowly flowing to the marshy area on the west side of the highway through the hedgerow of trees on the west side. Windrows of snow piled along the base of the West-side trees impeded escape of the pavement runoff to the marsh. Drainage corrective measures were installed during the summer of 1964.

Comparison of healthy sugar maple leaves (top of clipboard) from an east side tree with leaves demonstrating leaf-margin burn from a west side tree.

(Continued next page)

Typical west side trees. Limbs of tree partially shown in upper left of photo demonstrates defoliation.

SUMMARY

Investigation of sugar maples along a section of Route 17 in central Connecticut indicates that applications of rock salt for highway ice-control are reflected in higher than normal chloride levels in leaf and twig tissue.

Severe leaf margin burn and defoliation of the trees was found only where the salt-brine runoff polluted the root-zone soil of trees growing on the west side shoulder which was level with the pavement. Drainage of the area was across the west side tree belt toward a marshy area.

Higher than normal twig chloride levels would lead one to suspect that the chlorides are accumulated over a considerable period. The accumulation of chlorides probably accounts for the fact that three of the defoliated trees had relatively low leaf chloride levels. This phenomena would be related to a much lower metabolic condition of severely defoliated trees, which probably received a near lethal dosage in a previous year. A fourth nearly defoliated tree which xhibited a leaf chloride level of over 0.7% (7132 ppm) died in the fall.

It would appear from this study that leaf chloride levels of 0.5% and twig chloride levels of 0.05% or above will produce leaf margin burn on sugar maples.

Sustained chloride content reflected by leaf chloride levels exceeding 0.8% and twig chloride levels approaching 0.1% will produce severe leaf margin burn, defoliation and limb die-back, and eventual death of the tree.

NOTES AND REFERENCES

Leaves with petioles, and twigs were removed from three limbs (with an originating diameter of 1½ inches) cut from each tree. The trees were tagged with a metal label to facilitate future sampling and reference. Leaves and twigs were separately dried and ground through a twenty mesh screen in a Wiley mill. Samples were collected on August 18, 1964. Chloride content was determined by the potentiometric method.

1. It has been the standard practice of the Department to use rock salt at the rate of five hundred pounds per mile (two-lane width) per application. The number of applications per storm is dependent upon the duration of the storm. The number of applications per year depends upon the number of storms.

2. Connecticut State Highway Department, Division of Research and Development, Report #1, August 1964.
3. N. L. Lacasse and A. E. Rich, Phytopathology Vol. 54, #9, Sept. 1964.

The data presented is based upon investigations conducted for the Division of Research and Development under Project 5.820-175-117, "Literature research and Field Studies to determine the effect of salt on trees and shrubs." Reports #1 (August 1964); #2 (Potentiometric Method, September 1964); #3 (Influence of Rock Salt used for Highway Ice Control on Mature Sugar Maples at One Location in Central Connecticut, October 1964) are available upon request from the Connecticut State Highway Commissioner.

14 December 1964

Shade Trees

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Massachusetts is noteworthy for its beautiful shade and ornamental trees. However, trees are either lacking around some home or existing trees are in poor health. Frequently, homeowners have relied on the plantings of the previous generations. Now is the time to take a new look at our own properties to see if shade trees are needed.

Every homeowner should have at least one large shade tree and possible one or two smaller trees if space permits. Trees, as you know, are often planted primarily for shade. Not only do trees make a property cooler in summer, but they will help to cut down fuel bills in winter by serving as a windbreak. Then, too, a property planted with a few trees will look far more attractive than when left barren.

Trees along the street are usually planted by the town or highway department. If there are power lines overhead, it would be advisable to plant the trees back on the property where conditions are better for growing. In fact, some towns have adopted a policy of giving trees to the homeowner for front lawn planting and omitting the avenue of trees along the street.

WHERE SHOULD YOU PLANT TREES ON YOUR PROPERTY?

First, you consider where you need shade. In the morning the housewife may want the roof of her kitchen or the back door shaded; in the afternoon the terrace or the living room shaded; in later afternoon, the picnic area or bedrooms shaded. Each family must decide for themselves on the ideal placement of their trees.

Because of the customary high temperature, mid-summer is an excellent time to see where you need trees. Measure off 40-50 feet diagonally from the southeast corner of your house. By holding one arm straight above your head, see if your shadow points toward the house at about 11 a.m. If not, change your location. A tree placed diagonally off the corner usually does not interfere with the view outside. However, there may be other factors which may alter the placement of the tree, such as poor drainage, gravelly or dry soil or nearness to sidewalk, driveway, pipelines, overhead wires or other trees. Repeat your shadow testing in early and late afternoon and don't forget the shade for the picnic or croquet area for the family in early evening.

The amateur may plant trees too close together. Large trees, such as Sugar Maples, should be planted at least 50 feet apart; medium-sized trees such as Pin Oaks should be planted 40 feet apart; small trees such as Flowering Dogwood, 30 feet apart.

WHAT TREES SHOULD YOU PLANT?

Don't be impatient for shade and select a Catalpa, Chinese Elm, Willow, Poplar, Silver Maple, or Horse-Chestnut. The branches of these trees are easily broken by wind and ice and the roots often plug drain tiles. However, they are sometimes planted as a temporary tree along with more permanent trees such as Sugar Maple, Red Maple, Pin Oak, or others. As soon as the branches touch, the temporary trees should be cut down. Unfortunately, this may not be done, with the result none of the trees mature into healthy specimens. The soil and climate varies throughout Massachusetts, thus reducing the list of favorite trees.

The types of trees to plan depend upon the space available, soil acidity, moisture and the actual growth habits of the particular trees. There are many impressive tree plantings which contain only one variety of tree, but usually a more informal arrangement with several different varieties is preferred. In this way, a more pleasing variation is achieved and the possibility of losing an entire planting from disease is lessened.

There are many types of trees available which can be selected to fit into most any location. These may be selected horticultural varieties that vary from the basic type: columnar, broad columnar, broad shaped, broad spreading and even dwarf. Therefore, with a knowledge of what you need in a tree, you can often find one in the nursery that is "tailored" for your purpose.

The chances of survival of nursery-grown stock are greater than of trees dug from the woods. However, those of you who have your own woodlot may transplant small trees such as Maple that are not more than one inch in trunk diameter with fair success, providing the trees are transplanted before the buds break in the spring, or just after the leaves drop in the fall.

FERTILIZING YOUR TREES

Since lawn clippings, fallen leaves and fallen twigs are continually raked and destroyed, the trees often show signs of malnutrition. For example, the leaves may be off color, new growth is short and weak or basal limbs may die. Remember too, a healthy tree is generally more resistant to insect and disease pests.

A well balanced fertilizer such as 5-10-10 or one having a similar analysis should be applied every 2-3 years in our gravelly or sandy type soils. In order to get the fertilizer to the roots it is well to punch holes in the soil 12-18 inches deep and about 2 feet apart with a crowbar. Arrange the holes in concentric circles, starting not less than one foot from the trunk, and extending out to the spread of the branches. Apply 2-4 lbs. of fertilizer for each inch of trunk diameter for mature trees. However, for smaller trees, less than 6 inches in diameter, you would use just ½ the rate, 1-2 lbs. Apply the fertilizer evenly among the holes. An old cup may be used to apply about ½ cup of fertilizer to each hole. A funnel will help to get the fertilizer in the holes and not on the grass. Afterwards, the hole should be plugged with soil.

Tree may be fertilized in early spring, as soon as the frost is out of the ground, or in late fall (October, after the top growth has ceased). Late summer applications could encourage succulent growth which may be susceptible to frost injury.

For further reference on proper location, planting, and pruning of trees, send for Leaflet No. 248, *Your Home Grounds,* and U.S.D.A. Bulletin entitled, *Care of Damaged Shade Trees,* No. 1896.

TURF CONFERENCE

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Golf Courses

By James L. Holmes
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In 1962, according to a National Golf Foundation survey, there were 3618 9-hole and 2903 18-hole golf courses in the U. S. Over one-half of these courses are located in the 20 state area we are considering—1894 9-hole and 1638 18-hole courses. The ratio of 9-hole courses has remained quite constant for the past few years.

It can be determined from figures published by National Golf Foundation in 1960 that the average size for a 9-hole course is roughly 60 acres; for an 18-hole course 140 acres. However, acreage estimates from 30 clubs in the New York and Chicago areas for 18-hole courses is closer to 155 acres per course.

In compiling data on use of agricultural chemicals, it is important to consider the total acreage of rough, fairways, tees, and greens. Although herbicides and insecticides are occasionally used in out-of-play areas, consumption is not considered sufficiently important for inclusion here.

FAIRWAYS

The average 18-hole course consists of 10 par 4, four par 5, and four par 3 holes.

Most people dealing in golf often figure that total fairway areas are 60 to 70 acres; however, this cannot be true unless roughs are not maintained and fairways are excessively wide. The more astute operators are well aware that wide fairways are costly; there is a great variance in per acre maintenance cost between fairways and roughs.

ROUGHS

Ideally, rough areas are the same size as fairways, or slightly larger, for maintenance and budget consideration. Naturally, there is a great variance here depending upon terrain and width of maintained fairways.

TEES AND GREENS

So-called modern design includes larger teeing areas. Therefore, many of the newer courses have expansive teeing surfaces. Nonetheless, I have found that tees are far less in area than most estimates indicate.

The average tee in the 20-state area we are considering is no larger than 1200 square feet. (This figure includes the newer courses with larger tees.) The average teeing area per course is 19 (including practice tee) x 1200 square feet or approximately ½ acre.

Here again estimates can be erroneous. One often hears that greens on a certain course average 5000 square feet. On newer courses, greens ar occasionally larger than this, even up to 14,000 square feet. However, all courses considered, I would estimate that the average green is between 3000 to 4000 square feet; 3500 square feet is an ample estimate:

3500 square feet x 19 (including practice green) = 66,500 square feet or 1½ acres.

For ease of figuring consider 2 acres for 18-hole courses and 1 acre for 9-hole courses. It must be remembered that this is an average.

There is no definite or set maintenance program. Each individual golf course superintendent follows a program he personally considers superior. However, a few procedures are standardized which can be used to figure estimates of materials used.

BENTGRASS FAIRWAYS

Requirements for plant nutrients are between 120 and 160 pounds actual nitrogen per acre per year and approximately one-half this amount of phosphoric acid and potash. The courses with higher maintenance budgets will fall within this range. As a matter of fact, if they expect to maintain bentgrass fairways in top condition at all times there is no choice.

Parent soils vary with regard to quantities of phosphorus and potassium inherent in the soil along with the histories of past fertilizer usage. Nonetheless, for estimate-analysis, this ratio of one-half total nitrogen can be used. I would estimate that no more than one-tenth of the courses in the area under consideration fall in this category.
An educated guess for an average would be 90 pounds of actual nitrogen.

There is an increase in fungicide usage on bentgrass fairways and this will continue to increase. Of the total 3622 courses considered I would estimate that 250 courses are regularly following a fairway fungicide application program. At the present time, for all intents and purposes, fungicide use is limited to phenyl mercuric acetate mixed with iron sulphate. Rates are 1 quart of 10% PMA and 3 pounds of iron sulfate per acre. Six treatments per season is average.

All courses use herbicides. Both post- and pre-emergent chemicals are used. Bentgrass is quite subject to chemical damage from many post-emergent hormone type products and care in their use must be taken. Nonetheless, 2,4-D, 2,4,5-T, and 2,4,5-TP continue to find the greatest use simply because superior products are not available. For the past couple of seasons new chemicals have been tried which show considerable promise. To date, exacting toxicity data has not been adequately determined for many of these products.

The weeds which constitute the most serious problem on bentgrass fairways are leafy weeds such as dandelion, plantain, clover, yarrow, and knotweed, and grasses such as Alta fescue, crabgrass, nimblewill, and *Poe annua.*

Pre-emergent herbicides are gaining in favor. Still in greatest use is lead arsenate. However, many new chemicals are showing excellent results and their usage will increase to the point in a few years to where lead is no longer used.

The high-budget courses can afford to apply lead arsenate at a rate of 400 pounds per acre. Lead is currently selling at or above 30 cents per pound, so cost is at least $120 per acre. Naturally, golf course people would prefer to spend considerably less than this but the fact remains that for adequate control of a pesky weed (and in this case insects also) many courses will spend up to $120 per acre.

BLUEGRASS FAIRWAYS

Nutrient requirements for bluegrass (not including the Merion strain) is less than for bentgrass. Optimum requirements are between 90 and 110 pounds actual nitrogen per acre per year and approximately one-half this amount of phosphoric acid and potash. However, I would estimate that only about one-fifth of the courses which maintain bluegrass fairways apply this amount. In fact, I call on many courses which have never applied 1 pound of fertilizer to fairways. An educated guess here would be an average of about 30 pounds of actual nitrogen per acre per year.

Fungicides are rarely used on bluegrass. Occasionally leafspot becomes so severe that PMA and iron sulfate are applied. However, fungicidal usage on bluegrass fairways is hardly a discernible factor, even though it should be.

Herbicides are regularly used. Damage to bluegrass is much less of a factor than with bentgrass. Also, once weeds have been eradicated from bluegrass, re-encroachment is slower than with bent. In actual dollars spent per acre, I would estimate that bentgrass is twice that of bluegrass.

Insecticide usage is about the same for both types of fairways. There is no set program for application of insecticidal chemicals but rather they are applied as needed. Infestation of insect grubs is the most serious problem and one which must be handled immediately.

My experience would indicate that an insecticide is applied to all fairway and rough areas of all courses under consideration on an average of once every three years, except in areas where Japanese beetles are serious. In that insects *must* be controlled the $120 per acre figure for lead arsenate indicates the maximum amount which would be expended for this purpose. Many effective insecticides are available and are used.

GREENS

I know of no other crop grown on as large a scale which is as expensive to maintain as is bentgrass for putting purposes. An estimate here is $100 per green per year for fertilizers and chemicals or $1250 per acre. The following data can be used to determine total amounts of products used.

(1) Fertilizer requirements are 7 to 9 pounds actual nitrogen and approximately one-half this amount for phosphoric acid and potash per 1000 square feet per year. This amount is used on all courses with few exceptions.

(2) Fungicides are applied on an average of eight times per season for all courses in the 20-state area considered. This is my own estimation and is derived from experience and available budget data. The better courses will treat up to 20 times per season; the poorer courses will treat at least once.

(3) Pre-emergent herbicides are used more frequently than are post-emergent chemicals. Hormone type products are rarely used because of the toxicity factor. Lead arsenate finds extensive use — rates are 6 to 10 pounds per 1000 square feet per year. Other chemicals are being tested and their use will no doubt gradually increase.

The amount spent or the cost per acre to overcome some serious problem on putting surfaces cna be extremely large. I would estimate up to at least $1000 per acre for the better courses.

(4) Insecticides are applied as needed. I simply am not able to arrive at accuate estimates with data at my disposal. It might be worthwhile to note that grubs are not a problem in greens where lead arsenate is regularly used, and that contact insecticides are used at rates recommended by the manufacturer every time a brood of the various kinds of cutworms or sod webworms hatch. This is done on all courses regardless of the size of budget as insects must be eradicated. If necessary, insecticides are purchased even though the particular purchase is not included in the budget and budget estimates are exceeded.

TEES AND ROUGHS

For all intents and purposes, bentgrass teeing areas receive basically the same care as bentgrass greens, and bluegrass tees receive the same care as do bluegrass fairways.

I would estimate that insecticides and fertilizers are applied to rough areas once every five years (average) on all courses under consideration. Herbicides of the hormone type are applied once every 1½ years. Pre-emergent products are rarely applied to rough areas. However, with the newer products being tested I believe pre-emergent chemicals will gradually consume the majority of this market.

BUDGET CONSIDERATION

I have in excess of 270 budgets. These are estimates made by various golf associations and budgets which I have personally obtained. In the majority of cases fertilizer and chemical costs are grouped and reported under the same heading. However, there are a sufficient number which list chemicals (insecticides, fungicides, herbicides) and fertilizers separately to develop a trenr. This trend indicates that approximately twice as much money is spent for fertilizers than is spent for chemicals.

The average expenditure for both fertilizers and pesticides is $6250 per course. (No breakdown between greens, tees, fairways, roughs is available from these budgets.) This would mean that approximately $2085 is spent for pesticides and $4165 is spent for fertilizers. My experience indicates that the total cost for chemicals roughly could be divided into two-fifths for fungicides, two-fifths for herbicides, one-fifth for insecticides.

The above figures are for courses with bentgrass-watered fairways and are the top-budgeted, best-maintained clubs. The amounts spent will spread between $6250 for the best clubs as indicated and $1000 for the lesser budget courses. Courses with higher budgets will not comprise more than 15 to 20% of the total.

Reprinted from *Farm Chemicals 1964*

The Colleges Of Agriculture In Search Of An Identity

Portions of an address given at the Initiation Banquet of the Alpha Zeta Fraternity, December 5, 1964, by H. B. Gunner, Ph.D., Institute of Agricultural and Industrial Microbiology, University of Massachusetts, Amherst, Massachusetts.

. . . . . It has become a commonplace among sociologists to say that the western world is suffering from a crisis of identity. On a personal level this is to say that individuals are no longer certain who they are, what they are doing, and where they are going. The impact of technology in our own country has imposed so great a mobility, such a terrifying interchangeability of individual with job function that a typical American suburb can boast that the average period of residence for a family in its environs is eighteen months. The breakdown in ethnic groups, the loss in the tight family structure of a generation or two ago has left us each stranded at some time; removed from parents, grandparents and the environment of our childhood. This social fragmentation has been further advanced by a growing cultural cleavage. The British novelist, scientist and civil servant, C. P. Snow, has spoken of the division into "The Two Cultures". The humanists have become so divorced from the scientists (or as they would have it, the other way around) that each is declared by the other to inhabit and communicate in terms intelligible only to members of their separate cultural community. So, it is with this social and cultural loss in identity that students of agriculture, in an America which has become urban and industrial, should as well be questioning their own status, future and relevance to the demands of the contemporary world. It is, I think, particularly fitting that this subject should be raised on the occasion of the initiation of new members to Alpha Zeta, the Honor Fraternity of the College of Agriculture. You, after all, selected as the best among our students, represent the future. You are the ones who will go out to build the agricultural science of tomorrow, and it is owing to you that this future be discussed in all candor with you as you stand at its threshold.

I am, therefore, particularly glad to be able to declare at the outset that I speak of the future of agricultural science, not as though addressing some beleaguered minority, or some dwindling rearguard, but with a sense of profound optimism and belief in the contribution we are about to make. Nor is this statement to be regarded as being merely made out of the sense of obligation to any Establishment. I am neither Dean, nor Head of a Department. If I am moved to speak in this manner it is only out of a sense of the reality which I believe attaches to my own work, and which happily I am beginning to see pervade all of the works of the College of Agriculture.

Nor is this an opinion isolated from larger forums of thinking and expression on the subject of agriculture's future. In the autumn of this year, the New England Board of Higher Education published a Study of the New England Colleges of Agriculture financed by the Hood Foundation. In this report are explored the alternatives and their projections into the future which these colleges will face. The report at the outset reminds us that *the Colleges of Agriculture have been a major source of strength and creativity in the development of public higher education in the United States,* and it is well for all of us to bear in mind this profound and lasting achievement as a point of departure for our own discussions. In short, looking backward we have nothing to be defensive about. And, as we shall see, and as this report projects it, we have only a most significant future to look ahead to. *For this is a future which simply beckons agriculture to return to the sciences by whose application American agricultural technology has made its fantastic achievements.* The design of the curriculum of the four-year College of Agriculture will now be directed "to providing basic training in the tools of analysis and thought for the natural sciences, the social sciences, the physical sciences, and the humanities." What is conceived is an end to the dichotomization of science and agricultural science, of sociology and rural sociology, of economics and agricultural economics. What is sought instead is the application of basic scientific principles, not only to the classic problems of agricultural production, but to new fields of study which will inform as to how natural resources can, in general, make greater contributions to economic and social development. The Agricultural College, as it is in fact already in the process of evolving, seems best fitted to answer that whole range of new problems created by growing urban-rural contact, whether in terms of land relationships, wildlife management, recreation, regional planning, and economic development. The Extension Service with its corps of trained community workers provides an immediate reservoir for new approaches to the problems, not only of community development, but in a special appeal to youth, of community values.

. . . It is of particular interest that the report envisions that eventually the major function of what is now the College of Agriculture should be in the area of graduate study and research. The undergraduate program is thought of as a basis for graduate study and research in basic disciplines such as genetics, economics, hydrology, biochemistry, even of political science. As such, it should be combined with other curricula in the colleges of Arts and Sciences "as a series of broadening intellectual experiences". It may well be asked whether an educational institution which can be seen to provide a matrix for such an exhaustive training should not be a source of optimistic inspiration. My own inspiration in part, I must add, comes from my own teaching experience in the College of Agriculture. The students who reach our colleges are of excellent standard; are in fact, avid for the newer views of science, and if they will be tested by the new curricula which are in the offing, they will not be found wanting.

But what are these new curricula? What is this novel material which looms and promises on the horizon? I can speak of my own discipline best. Not so long ago I would have called this discipline "microbiology". However, it has now become so well-established that there is a continuity of biological phenomena through cells, organisms, and population that it is more apt to speak of biology rather than of its microscopic component. In my own field, as in all others, one must learn to speak the language of physics, chemistry and mathematics, and I dare say that this has become true whether the discipline is experimental psychology or microbial genetics. We have all begun to appreciate the profound harmony and overriding unity of all natural phenomena. The modes of thought which have been generated by this awareness now make it mandatory, for example, that anyone speaking of biological phenomena regardless of his particular little "ology" be conversant with molecular biology, cellular biology, genetics, developmental biology, organismic biology, the growth of populations and

communities, and of the principles of evolution. The foregoing is, in fact, the precise recommendation of the Commission on Undergraduate Education in the Biological Sciences of the AIBS. It should come as no surprise, and only as a healthy indication of the progress already achieved, that of the forty-two institutions participating in the conference which gave rise to this recommendation, twelve were state and land-grant institutions and seven were agricultural training programs. It is already too late to speak of the divorce of Colleges of Agriculture from contemporary trends when, in fact, *they are the very agents imposing these new patterns.*

And let us finally, for a moment, develop some sense of perspective of the relative position which the ferment in the agricultural sciences occupies in the whole spectrum of science. Let us remember the great revolution which had to, and is still taking place in the teaching of physics in our post-nuclear world; the great shift from clinical to experimental psychology; and which parent today is not struggling with the new mathematics brought home by his seventh-grade child? All our educational modes, all our classic identities, all our images of a future based on a nostalgic past are being challenged. But a challenge, if one understands its nature, is quite distinct from a threat. The great tradition of our agricultural colleges is one which is uniquely adapted for confrontation with the future. It has always drawn its strength from the basic sciences; it has shown its genius for translating its scientific findings into quickly applicable techniques. It has had in its Extension Service the most effective link between the scientist and the public ever developed in this country. As a source for teachers, research workers, technologists, and communications experts it is, therefore, singularly equipped to go forward and deal with contemporary challenges. There are, in fact, strengths in our agricultural colleges which we have not yet learned to appreciate. The lament over our relatively small student population — how ironic, when one thinks of the vast "sections" in other colleges taught in impersonal masses by anonymous instructors. Is size really our ambition? My personal preference, and a situation for which we must all be grateful, is for the small class, and for the opportunity to know each one of your students, as an individual human being. While others may dream of it, have we in effect in the College of Agriculture arrived at the vaunted tutorial system? And, if so, ought we not quietly to nurse rather than reject this offspring of our mature years?

I am an optimist, both for myself and for you in Alpha Zeta to whom the future in agriculture belongs. Let me leave you with one further thought. It has been said that a husband who leaves nothing at all to be desired is a doomed man. By this token, agricultural science, too, may have endangered itself by leaving too little to be desired. Let us then remember that we can be most helpful by being insatiable in our demands for constant growth, constant exploration and constant questioning within the many scientific identities embodied in the collective identity of agriculture.

Comments On The 1964 Season

by

HOLMAN M. GRIFFIN, *USGA, Agronomist*

For most areas in the northeast this was one of the driest years on record. Turf and trees suffered accordingly and those turf managers fortunate enough to have adequate supplemental irrigation available, bemoaned the water bill. Interest in irrigation systems, especially automatic systems, was keen as might be expected in such a dry year.

Insects were worse this year than in the last few years especially sod webworms, cutworms and some chinch bugs. At least one unusual problem was evident this year because of the drought and that was the swelling of thatch on greens after a sudden cloudburst which caused scalping by the greens mowers. A combination of softening of the green and swelling of the thatch following the deluge caused the greens mowers to sink in further and consequently scalp the turf at settings which were being used in the dry weather. However, even in such a year not all is bad and there is a brighter side to the picture.

Because of the drought, water could be applied as needed and courses usually suffering from poor drainage were not aggravated by rainfall. Superintendents had full control of the amount of water applied to greens and this usually makes for better turf. Disease incidence was low in most parts of the northeast except in early spring and the weather was ideal for work outdoors. New construction was not hampered by bad weather and there were practically no washouts of new seedlings.

Great strides were made in chemical weed control in 1964 which resulted in the popular usage of such chemicals as Dicamba and MCPP. Only last year, knotweed was a serious problem in turf and now it can be economically and efficiently controlled; however, soil moisture and temperature are important considerations when killing weeds chemically and all in all this was a poor year for extensive herbicide treatments. The MCPP formulations appear to be safer to permanent turf than similar phenoxy compounds in popular use in previous years. Altogether, these new materials, sometimes used in combination with some of the older standard herbicides, appear to be the answer to a multitude of weed problems but we are cautioned that the residual effects may inhibit the germination of new seedings for at least two weeks and longer in many cases. Also, C-1, C-19 and Seaside bentgrass seem to be sensitive to the new phenoxy compounds and may be severely injured.

At least five good pre-emergence controls for crabgrass are now on the market and several more are being tested. Post-emergence control of silver or hard crabgrass is still lacking but DSMA (disodium methyl arsonate), AMA (amine methyl arsonate) and PMA (phenyl mercuric acetate) will efficiently control common or soft crabgrass.

It is still hard for most golf course superintendents to decide whether *Poa annua* is a serious problem or a blessing in disguise but in any event, there is still plenty around. New pre-emergence controls on the market for the first time this year may one answer to the problem but remain to be tested on a wide scale by the consumer. Long term residual action may be considered both an asset as well as a disadvantage in some instances. There was also some interest in the use of calcium arsenate for control of *Poa annua* and other weeds.

Turf managers are better able to control thatch this year now that there are several different vertical mowers and thatching machines on the market along with a multitude of sweepers and vacuums for use in picking up thatch, clippings and leaves. Mechanical power rakes also look good for thatching purposes and tend to dig out thatch while leaving the grass blades intact.

Several clubs used the new thatching machines and sweepers to good advantage in a complete or partial renovation program on fairways and results were promising.

A new innovation in mowers was exhibited later this year which reflects some space age thinking. The new mower rides on a cushion of air rather than on wheels in contact with the ground. This idea may give some relief from compaction in the future, especially if adapted to larger types of machinery. The ease with which the new mower is maneuvered around trap edges and on slopes is another big factor in its favor.

Conventional type mowers now offer 9 and 10 bladed reels for smoother, more uniform cuts which improve appearance of freshly cut grass. Power steering and hydraulic control are now "old hat" but certainly make the job easier and units more adaptable and maneuverable.

New fungicides on the market continue to offer forms and formulas more acceptable to the user. You may now have a choice of several materials either in granular form, as a liquid or as a wettable powder.

Fertilizers continue to get more complex to make and easier to use. Just about every conceivable formula is or can be manufactured to specifications and you can choose between organic, synthetic organic or chemical as well as pelleted, granular or liquid. As if this were not sufficiently confusing, you also have to consider mode of action, trace element additives, and what the future has in store for such experimental fertilizers as plastic coated, resin type and metal ammonium materials.

With the rotary type of spreader now in use for solid types of fertilizers, the applications are certainly faster, easier and more economical.

Aeration tools have been speeded up and give more holes per square foot and now can be bought with attachments to catch plugs as they are removed which saves time and labor if plugs are to be disposed of.

Advancements have also been made in the area of new grass selections and spray equipment all of which indicates a high degree of interest in turf that was practically nonexistent a few years ago and we in the turf field hope that 1965 will be the best year yet and accomplishments will be greater than ever before.

PRECIPITATION OVER PERIOD OF 5 YEARS IN MASSACHUSETTS

The all time low was *30.23*

Normal is *43.70* which is average for 70-year period 1889-1958.

1960 — 47.64
1961 — 37.07
1962 — 30.93
1963 — 30.23
1964 — 30.27

FLOOD OR FAMINE

The national news has recently featured graphic stories of winter floods in California and Oregon. What is not generally appreciated is that much of our annual flood problem is man-made. The drainage of marshes in the midwest has so reduced the water storage capacity of the land, that flood control works completed at huge cost are unable to handle the deluge. An inevitable byproduct of this same drainage is increased severity of the summer drought. Hundreds of thousands of acres of marshes have been drained using Federal cash subsidies, under the Dept. of Agriculture, to create more farmland. Such a program, in a period of staggering farm supluses, is doubly damaging in that it strikes at the heart of our most precious natural resource — water.

Water is man's most valuable resource — we can live for weeks without food, if we have water; plants must have water in order to manufacture food; industry requires huge amounts of water; most outdoor recreation depends on water in one way or another — to swim and fish in, boat on, or look at.

Many communities in Massachusetts have a water problem in some form or degree — shortage, poor quality, contamination, flooding — or a combination of several. Such problems are often directly related to the land area on which the snow or rain falls — the watershed on which the community is dependent for its water needs. The use or abuse of your watershed determines in great degree the quality, quantity and dpendability of your water supply in all its many uses — agricultural, industrial, recreational and domestic. In some parts of this country such problems are restricting or preventing the expansion of cities and of industry. In many communities people already buy their drinking water in the supermarket!

Once water reaches the ocean it is lost to men's use for most practical purposes. As water falls in the form of snow or rain, the earth acts as a giant blotter — absorbing and storing, and slowing down its journey to the sea. Trees, grass, and shrubs tend to hold water where it falls, allowing it to soak into the ground rather than run off. Lakes and ponds hold it too, of course; of less obvious but paramount importance are swamps and marshes. Filled with aquatic vegetation and peat, a marsh stores water, acting as a huge sponge — allowing its water to soak into the ground and trickle out gradually down a brook or stream. Almost every brook has such swamps in its headwaters — without them, the brook becomes a raging torrent after a heavy rain, and dries up completely during dry spells, because it lacks the moderating storage action of marshes. Gravel is nature's water filter — bulldoze away a gravel hill, and nearby springs "mysteriously" go dry as another means of recharging our ground water supply is destroyed.

As our town, our state, and our nation become increasingly crowded, our water becomes increasingly precious. Every citizen must recognize that swamps, marshes, brooks, streams and ponds are vitally important resources enriching all of our lives — unique land forms which must be guarded so that they may continue to perform their function of providing drinking water, power and process water for industry, and wildlife and recreational opportunity in countless ways.

Ground water supplies are dropping throughout the country; our water requirements are skyrocketing. A major objective of all turf grass growers is to do all it can to conserve this resource, by preserving as much as possible of the natural watershed, and our swamps, marshes, ponds, and streams. — The Massachusetts Conservation Commission.

VERONICA FILIFORMIS AND ITS CONTROL

John F. Cornman, *Cornell University*

Veronica filiformis is a tiny creeping weed that has infested many lawns in upstate New York. Apparently it is a rock garden plant that has escaped from cultivation and is now widespread, even in areas where there is no recollection of its having been introduced. The prostrate stems, root at the joints, and bear opposite ovate to roundish leaves about the size of the eraser of a common pencil or the end of a cigarette. The margins of the leaves are crenate (scalloped) and the tiny flowers are pale blue and white, on slender, thread-like stalks.

Note, except for leaf size *Veronica filiformis* looks like Ground Ivy *(Nepeta)*. The leaf size of the two kinds is very different since ground ivy leaves are often larger than a nickel, while *Veronica filiformis* leaves are never as large as a dime.(For ground ivy use 2, 4-D in repeated applications, plus improved maintenance practices.)

At Ithaca, the fruit capsules do not mature and develop seeds, so it appears that *Veronica filiformis* is spread vegetatively. Snips of the plant could thus be spread by lawn mowers, shoes, in soil, and the like. *Veronica filiformis* seems to thrive particularly in moist, shaded places but is not at all particular on this point. In areas where it does well it will spread from a few patches to cover an entire lawn in a few years. It does not completely eradicate the grass, though it may appear to do so.

Regulations On Pesticide Use

E. H. Wheeler, *Professor of Entomology*
University of Massachusetts

The Massachusetts Pesticide Board has set forth the official Rules and Regulations relating to application and the use of pesticides in the Commonwealth.

If you use pesticides in Massachusetts certain of these regulations apply to your operations. It is important for you to know and to understand them.

A person licensed by the Board must be present whenever pesticides are being applied to public lands or to "land of another". "Land of another" is land not owned or controlled by the individual or concern making or supervising the application. Employees of a golf course (except a publicly owned course) would not need a license to apply pesticides to the land owned or controlled by the operators of the course. Anyone who is hired as a custom applicator to treat the course must have a license.

The law specifically exempts farmers from the licensing requirement, with this exception. If a farmer applies pesticides for someone on land he does not own or control through a leasing agreement, a license may be required. It most certainly will be required if this is done to any extent for hire — in other words, if it is a sideline business.

The Board has developed certain general regulations which apply to all who use pesticides. Others apply to licensed persons only and will not be discussed here.

You must remember that the term *Pesticide* refers to weed and brush killers; hormone-type, thinning, fruit setting and drop preventing chemicals, defoliants and dessicants as well as to nematocides, insecticides, fungicides and rodenticides. Materials used to control birds, fish, other mammals, etc. are included also.

The pesticides you use within the Commonwealth must have been registered with the Division of Food & Drugs of the Massachusetts Department of Public Health regardless of their origin. You are required to use these materials according to label restrictions; only according to registered uses, at the dosage given and at the indicated frequency and pre-harvest intervals. You will recognize that this is hardly a new regulation! Have you been careful to follow label directions? It pays!

Applications to areas within the watershed of a public water supply (or in the vicinity of public or private wells) must be carried out very carefully to prevent any possibility of contamination. Special permits may be necessary.

You must avoid direct application, drift or other hazard to land, crops, etc., adjacent to your target area. But remember, and get your neighbor to understand also that certain materials may be used without hazard even though drift does occur. If you have a problem situation, learn about these materials. Stay out of trouble!

Has the local Board of Health approved your dump? It's the law, and not a new one either. Combustible containers may be burned in the open (but not if they contained organophosphate insecticides or hormone type weed killers). If you do not have a public incinerator available and do not operate in an area under the jurisdiction of an air pollution control agency, adhere to local fire regulations.

Burial, at least 18 inches deep, in a place where water contamination cannot occur is required for excess pesticide concentrates and spray or dust mixtures, for ashes and for containers after suitable decontamination, breakage or crushing. *(Continued Col. 2, Page 22)*

A Perspective Of Water

Dr. William C. White
Agronomist, National Plant Food Institute
Washington, D. C.

To man, and to plants, water means much more than simply the substance hydrogen oxide—H_2O. It means life.

Water forms the soil solution from which roots absorb 13 of the essential plant nutrient elements. It provides a "transportation system" for nutrients in the soil, as well as for nutrients, sugar sand other materials within plants. A water film surrounds all living roots.

Water itself is also a source of one of the nutrient elements—hydrogen.

In soil, water occupies about half the pore space, or about one-fourth of the total volume, at the optimum soil moisture level for plants. This water, held by capillary and surface forces, exists mainly a sa thin film on soil particles. It is this thin film of water that provides the "nutrient solution" for plants, and the source of water for plants.

The water film on soil particles is extremely thin. As Dr. J. F. Lutz[1] has so well expressed, "The difference between a good crop and no crop is literally a thin film." He has reported that this film consists of only 15-20 molecular layers of water. Its thickness is from about 0.00000005 to .0000003 inches. Or expressed different, this film is so thin that there are about 3.3 to 20 million film thicknesses in one inch.

Water is an abundant substance. About 75 per cent of the earth's surface is covered with water, including ice caps. It makes up a larger portion of living matter than any other substance. Man's body is about 70 per cent water, and as much as 95 to 98 per cent of fresh plant weight is water.

Abundant supplies, however, do not mean adequate water for a given location. Annual precipitation in the United States ranges from 5 to 140 inches. The average is about 30 inches. About two-thirds of this falls in the eastern states and one-third in the 17 western states.

Edward A. Ackerman[2] has estimated that close to 10 per cent of the total harvested cropland in the U.S. is irrigated. The average rate applied is 3.6 feet, or 43 inches a year. Irrigated farms in recent years have produced about 12 per cent of the value of all agricultural production.

Increasing our attention to water is highly justified. As requirements for fertility, weed control, etc., are more fully met with modern production practices, inadequate soil moisture will become the factor most frequently limiting plant growth. Practices to improve efficiency of water use by plants will obviously become increasingly important.

—*Plant Food Review 1964*

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(1) Department of Soil Science, N.C. State, Raleigh, N. C. In Soil Service Society Proceedings of N.C., 1962.

(2) Carnegie Institute of Washington, D. C. In "Water and Agriculture."

Knotweed

R. R. Davis, E. W. Stroube and R. W. Miller

Knotweed, sometimes called doorweed, is known by botanists as *Polygonum aviculare*. It is a familiar sight along sidewalks and driveways, in athletic fields or other areas receiving heavy traffic. Whether the traffic is from animals, human or otherwise, or from vehicles makes little difference.

Until 1962, knotweed was seldom found in well tended lawns in areas receiving no concentration of traffic. For reasons not well known, although probably related to two consecutive very dry growing seasons, knotweed became a very widespread weed problem in 1962 and still worse in 1963.

Summer Annual

Knotweed is a summer annual. It germinates in very early spring and produces an abundance of seed before frost stops its growth in the fall. It is well adapted for growing in a lawn. A long taproot goes deep for the moisture that keeps it green and growing while lawn grasses are brown and dormant from drought and heat. The wiry stems start from a central crown and grow out in all directions to make a circular patch. These stems lie close to the ground and the small blue-green leaves are missed by the mower. The stem may grow two feet long on an isolated plant, but only a few inches long where there is a heavy stand of knotweed. The unsightly knotweed patches of summer become more unsightly after frost kills it. The reddish-brown stems remain in the lawn throughout the fall and winter seasons.

Methods of Control

Since a normal application of 2,4-D does not kill it, knotweed is a special problem which calls for special control measures. It germinates in March or early April depending on the season and location in the state. The cotyledons (often incorrectly called the first leaves) open soon after emergence. If used at about twice the rate suggested for dandelions, 2,4-D, 2,4,5-T or silvex on a mild day soon after the cotyledons open will kill most of the young knotweed. This treatment is much less successful after knotweed develops some true leaves. Proper timing is absolutely essential for good control and since the treatment should be applied earlier in the spring than most home owners work on their lawns, 2,4-D has not been widely used with success. Either 2,4-D or the other chemicals at this heavy rate will kill or injure any new grass seedlings present. Thus, successful knotweed control with 2,4-D and good establishment of new grass in bare spots is not likely the same spring. Other treatments which have been used with some success are zytron (as used for crabgrass control) before or soon after knotweed germinates and endothal after the weed is up and growing.

New Chemical

A new chemical called dicamba (2-methoxy-3,6-dichlorobenzoic acid) appears to be more selective for knotweed at any stage of development than any other available chemical. In a test at Wooster applied as a spray June 4, 1963, dicamba at the rate of one pound of active ingredient per acre gave excellent control of knotweed. (One tablespoon of a 4-pound-per-gallon formulation in 1 gallon of water sprayed to wet the weeds to the point of runoff is roughly equivalent to 1 pound of active ingredient per acre.) Silvex and 2,4-D at 2 pounds per acre or a mixture of 1 pound per acre of each gave essentially no kill of knotweed when applied on the same date. A ½ pound per acre rate of dicamba gave some, but not complete control. The results of a test at Columbus were less clear-cut, but fair to good control was obtained with dicamba at 1½ pounds per acre. Workers in other states report excellent control with ½ pound per acre at some locations. No injury to Kentucky bluegrass has been observed at the 2-pound-per-acre rate.

Other weeds in the test area controlled by dicamba at the 1-pound per acre rate were clover, purslane, annual chickweed and dandelion. Those that were not killed, even with 2 pounds per acre, were annual veronica, yellow wood sorrel and plantains. Observations with unreplicated trials indicate that dicamba at the 1-pound rate gives excellent control of red sorrel or sheep sorrel *(Rumex acetocella)*.

Hazard to Woody Plants

Dicamba, like other herbicides, is not perfect. The principal fault limiting its use is the hazard to desirable shrubs and trees. Woody plants will pick up dicamba from the soil when it is applied near them. The sensitive ones will be damaged or killed. For this reason, the use of dicamba should be limited to open areas free of trees and shrubs. This eliminates most home lawns. Further research with this material is needed to gain information about the differences in sensitivity of woody plants, before more precise recommendations can be made.

Many formulations of dicamba will be available. The Velsicol Chemical Corporation will market a 4-pound-per-gallon dimethylamine salt formulation under the trade name "Banvel-D" through professional turf and golf course supply outlets.

Most formulations will not be available to home owners through garden supply stores as yet.

Reprinted from *Ohio Farm and Home Research*

PESTICIDE—*Continued from Page 21*

The regulations prohibit the re-use of pesticide containers for food, feed or water and for the storage of cooking utensils, dishes and clothing. Never put a pesticide in any container normally used for human or animal food, feed or beverage. This is the most common cause of fatal accidents with pesticides — especially those in which children are the victims.

A little thought will make it very evident that these regulations are designed to insure greater pesticide safety. They do not seem unreasonable. Those charged with the responsibility for carrying out the mandates of the Pesticide Law are interested in promoting safe use. They are not trying to prevent the use of pesticides, only their misuse.

If everyone cooperates in this endeavor, additional, more restrictive regulations should not become necessary.

For more specific information relative to licensing, inquiries may be directed to the Pesticide Board, Department of Public Health, State House, Boston.

I think feminine charm is one of the qualities the modern way of life should not choke off. Mothers of girl-children should do all they can to teach them all the arts of feminine guile, because these arts, small and graceful, lend so much to the rugged aspects of living. No, I don't mean that Melissa should play dolls while the house burns down, pour tea while the nuclear war rages; but I think that girls and women with charm, manners, finesse, and grace may help keep the world on an even keel. May even keep the war gods away from their weapons.

—*Democrat,* Waukon, Iowa

How long are a few minutes depends on whether you are the one in or the one out of the bathroom.

—*Courier,* Fairfield, Conn.

FROM TO

MASSACHUSETTS TURF AND LAWN GRASS
COUNCIL
INCORPORATED
51 FENWOOD ROAD, LONGMEADOW 6, MASS

Welcome

*To The 1965 Turf Conference**

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