

James B. Beard

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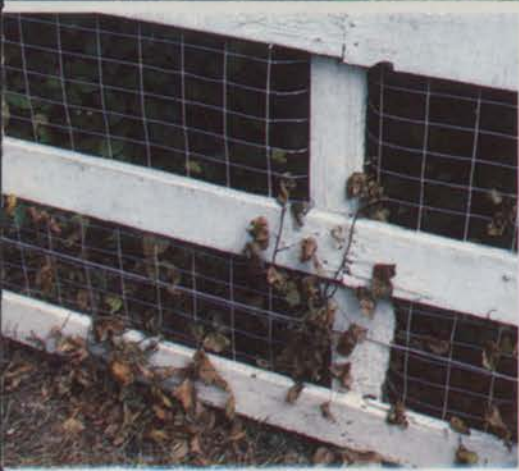
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Growth Regulators for Turf-Selection and Use

by John R. Street, Ohio State University



John R. Street is an Assoc. Professor of Agronomy/Turfgrass Science at the Ohio State University. He received his B.S. degree from Calif. State College in plant physiology and his M.S. and PhD degrees from the Ohio State University in Agronomy. Dr. Street's chief research interests are in turfgrass nutrition, nitrogen fertilizers, and weed control.

have not received large-scale acceptance because of certain use limitations.

THE IDEAL PLANT GROWTH REGULATOR

Turfgrass growth regulators vary in their chemical performance and characteristics. Ideally, a turfgrass growth regulator should exhibit the following characteristics:

1. Reasonably long residual activity (a minimum of 5 to 6 wks.).
2. Inhibition of seedhead formation.
3. No objectional discoloration or burning of turf.
4. Control or suppression of broadleaf weeds.
5. Repeated use not causing a significant effect on turfgrass quality.
6. Low toxicity to desirable vegetation and no long term residual.

None of the turfgrass growth regulators on the market today possess all of the latter characteristics. Some inhibit seedheads but have no ability to control broadleaf weeds. Some control broadleaf weeds but do not have any affect

on seedhead formation. Those that provide the most prolonged growth inhibition, generally cause the most turfgrass discoloration, thinning and/or phytotoxicity. These latter characteristics are actually the key deterrents to the use of growth regulators on high quality turfgrass areas.

GROWTH REGULATORS

Growth regulators currently available for turfgrass use are maleic hydrazide, chlorflurenol, mefluidide and flurprimidol. The compounds are available under various tradenames (*Table 1.*) In general, they slow or inhibit meristematic activity in one or more plant parts causing growth inhibition or stoppage. Some of these materials will also inhibit or suppress seedhead formation.

Maleic hydrazide, the first growth regulator made available for turf use, is absorbed by plant foliage and translocated within the plant to active meristematic areas. Anatomical studies have revealed that maleic hydrazide inhibits cell division in such plant parts as shoots, roots and buds. It does effectively in-

Mowing is a time-consuming and expensive turfgrass cultural practice. Ideally, turf managers would prefer a grass that produces little vertical shoot growth if acceptable color, turf density and surface uniformity could be maintained. A reduction in or elimination of mowing would save fuel, manpower and money and would provide more time for other grounds care activities.

Growth regulators (retardants) are a possible management tool for use in retarding turf growth and reducing the need for mowing. Growth regulators have been used for many years on certain turfgrasses to suppress growth, but they

TABLE 1: Presently Available Growth Regulators and Manufacturers.

GROWTH REGULATOR		MANUFACTURER
Generic Name	Trade Name	
Chlorflurenol	Maintain CF-125	Uniroyal Chemical Div. of Uniroyal, Inc.
Maleic Hydrazide	Several (e.g. Slo-Gro Retard)	Uniroyal Chemical Div. of Uniroyal, Inc.
Mefluidide	Embark	3M Company, Agricultural Chemical Products
Flurprimidol	Cutless	Elanco Corporation

Table 2: Effect of Growth Retardants on the Root Growth and Number of Rhizomes of Fylking Kentucky Bluegrass (4).

CHEMICAL(S)	APPLICATION RATE	ROOT GROWTH (GRAMS)*				RHIZOMES (NUMBER)*		
		3 weeks	5 weeks	7 weeks	9 weeks	3 weeks	7 weeks	9 weeks
	lbs./acre							
Maleic Hydrazide	5.0	0	0	2.3	5.5	0.9	1.9	3.3
Maleic Hydrazide & Chlorflurenol	1.0 + 3.0	0	1.4	6.5	14.1	1.2	3.5	3.5
Mefluidide	0.38	2.4	6.6	18.5	36.1	1.8	3.1	7.4
Mefluidide	0.75	1.6	9.9	19.6	43.9	1.8	2.5	5.6
Untreated	-----	1.8	15.0	24.6	31.0	2.5	4.6	9.1

*Growth of roots and rhizomes at various time intervals after growth retardant application.

hibit shoot growth and seedhead formation of many grasses (Table 2). It has been reported to reduce or inhibit root and rhizome growth of Kentucky bluegrass (Table 3). Its use on fine turf has been limited because of possible phytotoxicity and excessive inhibition of plant growth under stress.

Maleic hydrazide will not inhibit the growth of broadleaf weeds. In situations where broadleaf weeds are a serious problem or are not tolerable, maleic hydrazide should be used with common broadleaf weed killers.

The most effective foliar absorption of this chemical occurs when plant cells are turgid, usually in periods of high relative humidity and when there is adequate soil moisture.

Chlorflurenol is part of a group of compounds called morphactins. It is absorbed by the turfgrass foliage and readily translocated upward and downward to active meristematic tissues. It inhibits or slows cell division or meristematic activity in growing points and buds of herbaceous plants.

Very effective growth inhibition has been achieved with a combination of maleic hydrazide and chlorflurenol (Table 2). Chlorflurenol has also been reported to cause a reduction or inhibition of root and rhizome growth (Table 3). Chlorflurenol does provide herbicidal activity on many broadleaf weed species. It is also effective in seedhead suppression. Phytotoxicity and discoloration of turfgrasses have been observed after chlorflurenol applications. Chlorflurenol is sold under the trade-name Maintain CF 125.

A combination of maleic hydrazide and chlorflurenol was available for many years under the trade name Posan. This formulation was used primarily for seedhead suppression and control of annual bluegrass in Kentucky bluegrass and creeping bentgrass stands. Seedhead suppression of annual bluegrass in the spring was greatest when initial applications were made early, just before or at green-up, followed by a second application at one-half the rate approximately four weeks later.

The most effective control of annual bluegrass has been reported with fall applications of the latter chemicals. The fall applications have produced severe discoloration of Kentucky bluegrass and creeping bentgrass during the late fall and winter; however, normal green-up has occurred in the spring. Perennial ryegrass has been injured by the fall applications.

Mefluidide is a more recent growth regulator available for turfgrass use. It replaced the older 3M product, Sustar. The compound suppresses growth and seedhead production of turfgrasses (Table 3) and many broadleaf weeds. The compound does inhibit cell division or meristematic activity in those plant parts that contact the chemical. The compound is systemic but it does not appear to translocate downward in the plant as readily as maleic hydrazide or chlorflurenol. Phytotoxicity and root-rhizome suppression do not appear to occur as readily as with other growth regulators (Table 2). Surfactants are not recommended for use with mefluidide.

Table 3: Effects of Growth Retardants on Jamestown Red Fescue (4).

CHEMICAL(S)	APPLICATION RATE	Clipping Yield		Visual Rating at 6 Weeks*		
		7 WEEKS	14 WEEKS	SEEDHEADS	COLOR	DENSITY
		LBS/ACRE		No/M ²		
Maleic Hydrazide	5.0	160	633	2	6.1	8.0
Maleic Hydrazide & Chlorflurenol	1.0 + 3.0	184	701	5	7.3	7.9
Mefluidide	0.5	132	476	3	7.8	7.6
Untreated	---	1,509	700	277	9.4	9.5

*Rating scale is 1 to 10 with 1 representing poorest and 10 representing best.

Growth Regulators



Kentucky bluegrass— Kentucky bluegrass quality depends on the formation or regeneration of new plant parts.

because they apparently do not increase performance and have contributed to the temporary discoloration of the turf. Like the previous growth regulators, mefluidide may cause turfgrass discoloration and a reduction in plant density for a period of several weeks or longer after application. Mefluidide is sold under the trade name Embark.

Flurprimidol is the most recent growth regulator available for turfgrass use. It has been researched under the name of EL 500 and will be marketed under the trade name of Cutless. It has some broadleaf weed control potential, but it is generally ineffective in controlling seedheads. Embark-Cutless combinations are an alternative where seed-head suppression is desired. It is very effective in shoot growth suppression. Turfgrass thinning can be anticipated under stress conditions, but it does not appear to effect turf quality and recuperative potential as readily as other growth regulators. Presently, it is primarily being recommended for use on golf course fairways to limit mowing and favor bentgrass encroachment over annual bluegrass. Available information suggests that annual bluegrass is more sensitive to the regulator than Kentucky bluegrass or bentgrass.

A general understanding of turfgrass growth and development is neces-

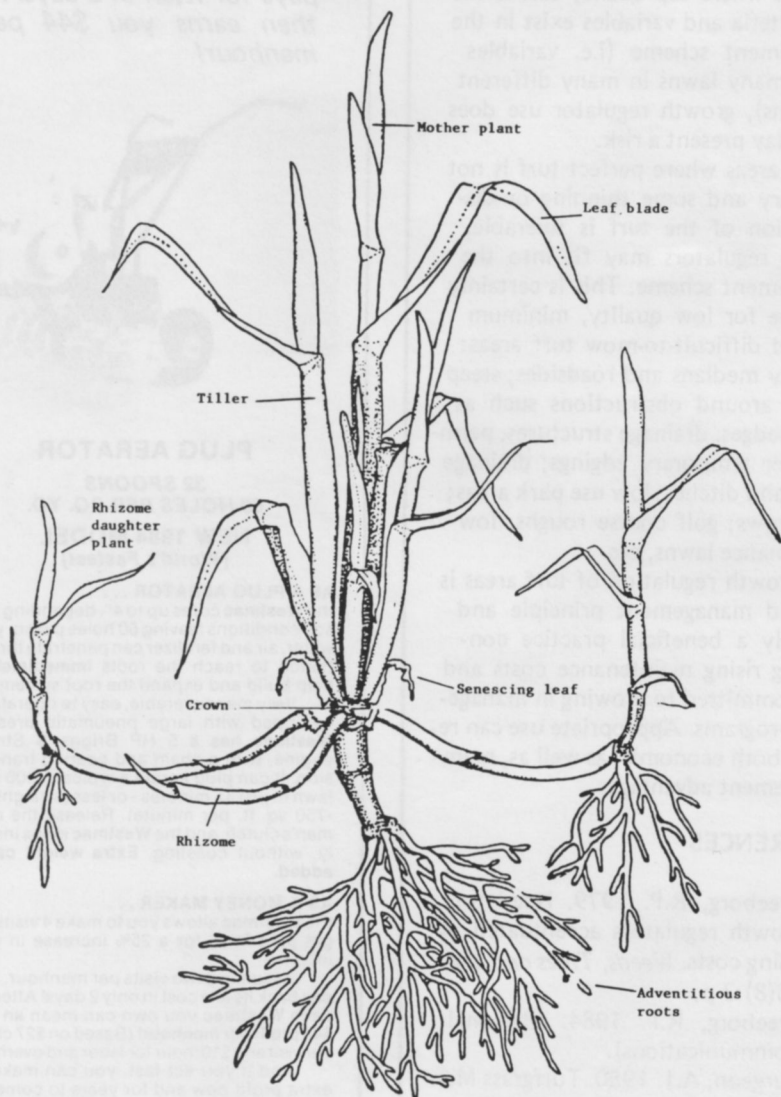
sary in order to recognize the use limitations of presently available compounds.

An established turfgrass stand is made up of thousands of individual plants that are in a constant state of change. The main turfgrass shoot that originates from the seed during establishment is commonly referred to as the primary shoot. The enlarged, basal node of this shoot and other secondary shoots is called the crown (see Fig. 1). The crown contains the stem apex or growing point of the turfgrass plant. The stem apex or growing point is an area of high meristematic activity and consists of a series of tightly arranged leaf primordia and other meristematic buds. New leaves continually arise from this meristematic zone to provide a contiguous cover of green leaves. Leaves have only a limited life span that is estimated at 35-40 days. New leaf primordia form at the stem apex and emerge from the crown as older leaves senesce and die. In order to maintain a contiguous green cover, leaf initiation and leaf appearance must be renewed to keep pace with leaf senescence and death.

Turfgrass density is also dependent on the development of lateral shoots (side shoots) that originate from vegetative buds which develop in axils of leaves, on the stem apex or growing

point. Lateral shoots that arise vertically from vegetative buds in the leaf axils of the mother shoot are called tillers (see Fig. 1). Several tillers can develop from the mother shoot or main shoot and, in turn, each new tiller can produce its own tiller complement of lateral shoots. The development of several tillers in close succession has a positive effect on turfgrass density. Like turfgrass leaves, individual tillers have a restricted life span. Tillers die and others appear on a continuous basis. The average life span of a tiller is estimated at one year. Thus, the perennial nature of a turfgrass community is dependent on the ability of turfgrass to constantly renew their own tiller complement. Renewal of leaves and tillers is a necessary process to sustain high quality turf when plant turnover occurs. Growth regulators, unfavorable environmental conditions, or other factors that retard tiller and leaf initiation and development can result in a reduced population of leaves and tillers, lower turf density, and, in turn, reduced turfgrass quality. A reduction in turfgrass density will also favor the encroachment of undesirable weed species further detracting from quality turf.

New turfgrass shoots also arise in turfgrass communities from lateral shoots termed rhizomes and stolons (see



(Figure 1) The perennial nature of a turfgrass community is dependent on regrowth of plant parts, such as leaves (blades), tillers, rhizomes, and roots following normal plant turnover or death. An inhibition of the turfgrass renewal processes will have a negative effect on turfgrass quality.

Fig. 1). Rhizomes and stolons are horizontal lateral stems that develop below and above ground, respectively. Like tillers, these secondary lateral shoots develop from axillary buds (buds located in leaf axils) at the stem apex. Vegetative buds on rhizomes and stolons give rise to new shoots and roots. These new shoots can give rise to their own tiller complement, as well as, additional rhizomes and stolons. Lateral shoot growth and the development of

new shoots from vegetative buds on rhizomes and stolons enhances the recuperative potential and rate of many turfgrass species (e.g. Kentucky bluegrass and creeping bentgrass). Recuperative potential is especially important on turfgrass sites that are injured by traffic or other mechanical or biological factors. Growth regulators inhibit the initiation and/or development of secondary lateral shoots.

A healthy turfgrass plant is depend-

ent on a well-developed root system in foraging for soil water and essential nutrients. During unfavorable growing periods, turfgrass plants with a deep, prolific root system are more likely to maintain an acceptable quality level compared to shallow-rooted plants. Turfgrass roots are however, no more unique than leaves and lateral shoots in that they have a limited life span of approximately 6 months to 2 years depending on species. In order to sustain an adequate root system, root initiation and development must be maintained on a continuous basis. Each new tiller develops its own root system from its base or crown and new plants forming from buds on rhizomes and stolons develop root systems as well. There is a constant turnover of old roots and formation of new roots within the turfgrass community. Interference in root initiation and development will obviously deter from the maintenance of high quality turf. Growth regulators have been shown to interfere, to some extent, with these normal root renewal processes.

In general, these compounds cause some discoloration and/or phytotoxicity, especially on closely mowed turf, and interfere with normal plant renewal processes. The inhibited turfgrass is not able to produce adequate regrowth to replace plant parts (i.e. leaves, tillers, etc.) lost via plant senescence and death. Eventually, turfgrass density decreases and the turf loses its uniform green color. Senescent plant parts and thatch underlying the above green vegetation become more visible creating an unsightly, low quality turf. Under stress conditions, where accelerated plant senescence or turnover may be high, turfgrass quality may suffer dramatically. In addition, recuperative potential is negated once the growth regulator is applied.

Disease incidence has been more prevalent on the turfgrass areas treated with growth regulators. Dollar spot, leafspot, and stripe smut have been reported as more frequent problems. Higher disease incidence is more likely due to a slow growth rate which negates any recovery potential from disease injury. Disease injury has a negative effect

Growth Regulators

on overall turfgrass quality. Fungicide applications have reduced injury from disease and even slightly reduced grass discoloration. An additional quality concern where growth regulators are used is a differential growth response and chemical tolerance of various turfgrass species and cultivars in mixed stands. For example, Kentucky bluegrass was reported more tolerant of maleic hydrazide and maleic hydrazide plus chlorflurenol than colonial bentgrass, red fescue, and perennial ryegrass. A differential plant response among species and cultivars in mixed stands creates a non-uniform or irregular surface and, in turn, further deters from turfgrass quality.

GROWTH REGULATOR USE

Growth regulators presently available provide turfgrass growth inhibition and seedhead suppression for 4 to 8 weeks under normal growing conditions. Environmental conditions and other variables can increase or decrease the longevity of growth retardation obtained. Chemical applications typically should be timed at least 2 weeks prior to suppression. Season-long control cannot be obtained with any of the presently available chemical inhibitors. This will usually necessitate reapplication where environmental conditions are favorable for plant growth. Follow-up applications at one-half the initial rate have effectively increased the length of growth suppression and reduced the amount of phytotoxicity and thinning that commonly occurs at higher retreat rates and high summer temperatures. Repeat treatments will increase the potential for additional thinning and a reduction in turf quality.

Available growth regulators have proved effective in growth inhibition and seedhead suppression, but their use on mowed, high quality turf has not yet gained wide acceptance. This is primarily due to undesirable side effects, such as discoloration, phytotoxicity, thinning and reduced recuperative potential. Embark and Cutless have reduced these potential problems to some extent. However, in management

schemes where top quality turf is the first criteria and variables exist in the management scheme (i.e. variables across many lawns in many different locations), growth regulator use does still today present a risk.

In areas where perfect turf is not necessary and some thinning or discoloration of the turf is tolerable, growth regulators may fit into the management scheme. This is certainly the case for low quality, minimum use and difficult-to-mow turf areas: highway medians and roadsides; steep slopes; around obstructions such as trees, hedges, drainage structures, permanent or temporary edgings; drainage canals and ditches; low use park areas; fence rows; golf course roughs; low maintenance lawns, etc.

Growth regulation of turf areas is a sound management principle and certainly a beneficial practice considering rising maintenance costs and time committed to mowing in management programs. Appropriate use can result in both economic, as well as, many management advantages.

REFERENCES

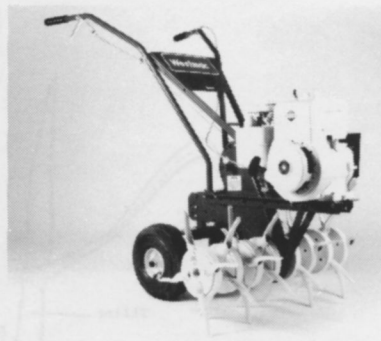
1. Freeborg, R.P. 1979. Need for growth regulators accentuated by rising costs. *Weeds, Trees and Turf*. 18(8):3 p.
2. Freeborg, R.P. 1984. (Personal Communications).
3. Turgeon, A.J. 1980. *Turfgrass Management*. Reston Publishing Company, Inc. 391 p.
4. Wakefield, R.C. and S.L. Fales. 1977. Effects of Growth Retardants on the Shoot and Root Growth of Roadside Turfgrasses. *Proceedings of the Third International Turfgrass Research Conference*. p. 303-309.
5. Watschke, T.L. 1979. Penn State tests reveal growth regulator pros and cons. *Weeds, Trees, and Turf*. 18(8):4 p.
6. Plant Growth Regulator Handbook. 1st Edition. Plant Growth Regulator Working Group. 1977.

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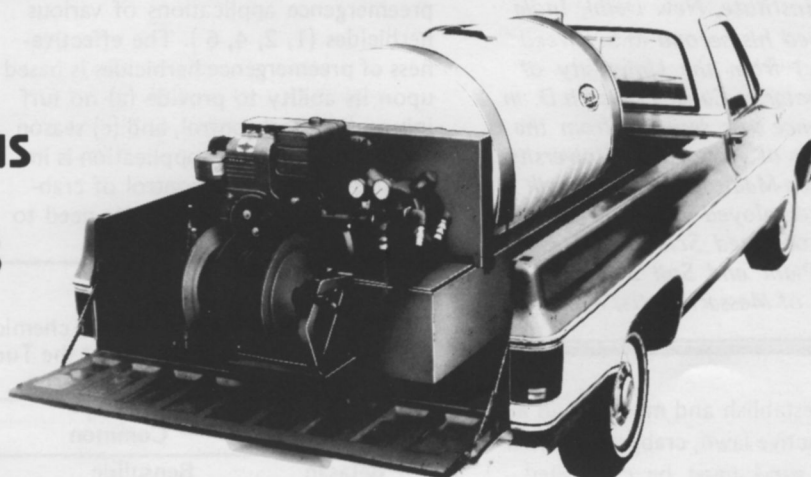
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Control of Crabgrass in Lawn Turf with Herbicides

by Prasanta C. Bhowmik, University of Massachusetts-Amherst



Dr. Bhowmik received his B.S. (Ag.) Hons. from the University of Kalyani, India. He received his M.S. (Agronomy) from the Indian Agricultural Research Institute, New Delhi, India and received his second M.S. (Weed Physiology) from the University of Guelph, Ontario, Canada. His Ph.D. in Weed Science was received from the Department of Agronomy, University of Wisconsin-Madison. Dr. Bhowmik is presently employed as an assistant professor of Weed Science, Department of Plant and Soil Sciences, University of Massachusetts, Amherst.

To establish and maintain an attractive lawn, crabgrass (*Digitaria spp.*) must be controlled. Crabgrass is a troublesome weed in turf lawns (1). Two species such as large crabgrass [*Digitaria sanguinalis* (L.) Scop.] and small crabgrass [*D. ischaemum* (Schreb) Muhl.] are common in lawn turf. These species grow at accelerated rates during the hot summer days, while cool season lawn grasses grow slowly or may even remain dormant. Thus, they compete effectively with desirable turfgrasses and survive through the undesirable growing conditions.

These species are particularly troublesome in thin undernourished lawns. In general, crabgrasses have a competitive edge due to their physiological makeup (3) over the lawn grasses. Most homeowners, turf managers, and lawn care operators will agree that crabgrass is a problem weed in most lawns.

A single crabgrass plant may produce thousands of seeds. These seeds are dormant during the winter and cool spring. These seeds can also remain dormant in the soil for many years, and therefore, can be expected as an abundant weed for several years following a year of heavy infestation. Selective control of crabgrass in turf lawns has become a standard practice. Crabgrass can be effectively controlled in turf by preemergence applications of various herbicides (1, 2, 4, 6). The effectiveness of preemergence herbicides is based upon its ability to provide (a) no turf injury, (b) good control, and (c) season long control. Time of application is important for effective control of crabgrass. Preemergence herbicides need to

be applied before crabgrass germinates in the spring. Crabgrass germination is related to soil temperature. When the soil temperature reaches 65°F, crabgrass begins to germinate (5). This varies with the local conditions of soil type, rainfall, and weather in the spring. Therefore, the application dates of pre-emergence herbicides will vary from one part of the country to another. The key point is that preemergence herbicides need to be applied before crabgrass germinates in the spring. Treatments made too late (i.e. after crabgrass germination) will not control germinating crabgrass.

Crabgrass experiments have been conducted over the last several years at the Turf Research Center, University of Massachusetts, Amherst. However, this article deals with the field results of 1982 and 1983. The herbicides tested at our research farm over the years, are included in Table 1 with trade, common and chemical names.

Several preemergence herbicides, rates and combinations were evaluated

Table 1: Trade, common and chemical names of herbicides used in crabgrass control studies conducted at the Turf Research Center, University of Massachusetts during 1982-1983 season.

Trade	Common	Chemical
Betasan	Bensulide	0,0 disopropyl phosphorodithioate S-ester with N-(2-mercaptoethyl) benzenesulfonamide
Devrinol	Napropamide	2-(α -naphthoxy)-N, N-diethylpropionamide
Ronstar	Oxadiazon	2-tert-butyl-4-(2,4-dichloro-5-isopropoxyphenyl) - 2 ¹ ,3,4-oxadiazolin-5-one
Dacthal	DCPA	Dimethyl tetrachloroterephthalate
Machete*	Butachlor	N-(butoxymethyl)-2-chloro-2, 6-diethylacetanilide

*It is an experimental preemergence crabgrass control herbicide.

Table 2: Preemergence control of crabgrass with bensulide and napropamide (1982 results)

Treatment	Formulation	Rate (Lb ai/A)	Control	
			12 Wks.	16 Wks.
			---- (%) ----	
Bensulide	7G	5	79	66
Bensulide	7G	7	94	71
Bensulide	4EC	5	71	60
Bensulide	4EC	10	99	95
Napropamide	5G	1	71	44
Bensulide + Napropamide	4EC + 5G	5 + 1	96	90
Untreated Check			0	0

during 1982 and 1983 on a five-year-old stand of Kentucky bluegrass (*Poa pratensis* L.) and red fescue (*Festuca rubra* L.). The area was heavily infested with crabgrass. The soil was a Winooski silt loam with pH 6.4. Bensulide 7G (Betasan) at 7 lb/A provided at least 90% control as shown by the ratings 12 weeks after the application (Table 2). Crabgrass control was less at 16 weeks. This was reflected by the percent of ground cover by crabgrass (29%). Bensulide EC (Betasan) at 10 lb/A gave excellent crabgrass control over the entire season (16 weeks). The lower rate of bensulide was not effective in controlling crabgrass. Treatment combination of bensulide EC (Betasan) and napropamide 5G (Devrinol) at 5 + 1 lb/A also gave excellent control. This treatment combination proved more effective as compared to either bensulide or napropamide applied alone. Similar effectiveness of the herbicide combination was also reported by Watschke and Welterlen (6).

Oxadiazon 50WP (Ronstar) at 3 lb/A active gave the most effective crabgrass control and the control lasted up to 16 weeks (Table 3). Some initial injury to Kentucky bluegrass was observed only in 1982 and this was fully recovered 15 to 20 days after application.

DCPA 75 WP (Dacthal) at 10 lb/A provided excellent season-long crabgrass control with good safety to Ken-

tucky bluegrass and red fescue (Table 3). The reinfestation by crabgrass was minimum at the end of the season. Crabgrass control was excellent with the treatment of butachlor 5 EC (Machete) at 7.5 lb/A. However, only 81% crabgrass control was observed 16 weeks after the application. This experimental herbicide shows promise in crabgrass control.

HERBICIDES OF THE FUTURE

Two new selective herbicides are in the experimental stage at our research farm and other locations. UC-77892 is a selective preemergence herbicide, showing great potential for the future. The 1983 results show excellent crabgrass control without any phytotoxic effect to Kentucky bluegrass. On the other hand, a new postemergent herbi-

cide (HOE A2501), shows great promise in crabgrass control (1983 data). A split application of HOE A2501 provided excellent control during the entire season without any injury to the turf. Further research is needed to fine-tune the performance of these two new products.

Crabgrass is a troublesome weed in turf lawns. Turf managers should keep in mind that part of the difficulty in controlling crabgrass stems from its seasonal variation in germination. Late germinating crabgrass may appear during the mid-summer. During this period, the residual activity of herbicides in the soil also declines. In addition, the potential for high seed production acts as a source of reinfestation.

Crabgrass control in lawn grasses is possible. Choose the most effective herbicide with maximum safety to the turfgrass. Changing the use of one class of herbicide to another class in your weed management program may provide a wide spectrum of weed control in lawn grasses. Turf managers and lawn care operators should emphasize on a preemergence herbicide program for crabgrass control with good management practices. This approach will minimize the competitive advantage of C₄ species like crabgrass.

LITERATURE CITED

1. Bhowmik, P.C. 1984. New Herbicides for Crabgrass Control in Turf. Proc. Northeast. Weed Sci. Soc. Vol. 38:282-288.
2. Bhowmik, P.C. and J. Troll. 1983. Preemergence crabgrass control in

Table 3: Preemergence control of crabgrass with oxadiazon, dacthal, and butachlor. (1982 results)

Treatment	Formulation	Rate (Lb ai/A)	Control	
			12 Wks.	16 Wks.
			---- (%) ----	
Oxadiazon	2G	3	95	86
Oxadiazon	50WP	3	100	100
DCPA	75WP	10	98	91
Butachlor	5EC	7.5	99	81
Untreated Check			0	0

Control of Crabgrass

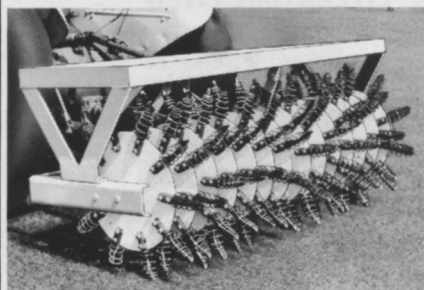
- turfgrass. Proc. Northeast. Weed Sci. Soc. Vol. 37:391-395.
3. Hull, R. 1982. The lawn weeds of summer. *American Lawn Applicator*. Vol. 3:5:12-16.
4. Johnson, B.J. 1982. Combination of herbicides for winter and summer weed control in turf. *Agron. J.* 74:37-40.
5. Kageyama, M.E. 1982. Controlling weeds in turf. *American Lawn Applicator*. Vol. 3:2:10-14.
6. Watschke, T.L. and M.S. Welterlen. 1982. Preemergence crabgrass control in turf. Proc. Northeast. Weed Sci. Vol. 36:298-300.

+++

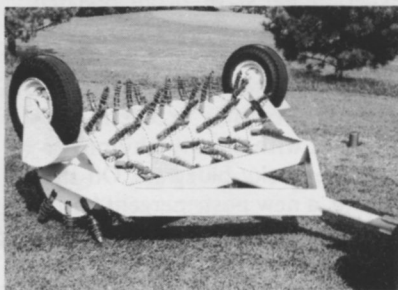
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Business Planning and Control

by Michael C. McKee, New England Green, Inc.



Michael C. McKee is currently President/Co-Owner of New England Green, Inc. Prior to New England Green, Inc., Mike served as Vice President of Operations for the Tru Green Corporation, East Lansing, Michigan. He received his undergraduate degree in business from Michigan State University and attended graduate courses at George Washington University.

The primary functions of a business manager include: planning, organization, staffing, direction and control. For the purposes of this article we will concentrate on the importance of business planning and control. It is not intended to be a theoretical discussion, rather it is simply offered as a review of the basics.

FINANCIAL CONTROL

It is critical to stay in close contact with the vital statistics of your business. This is accomplished through sound accounting practices. Good accounting is your method of keeping score. The business manager who does not engage

reputable accountants external to his operation, even if just for audit purposes, is remiss in his responsibilities. The success of any business depends on the financial outcome. Those who are interested in growing their business can only accomplish this by reaching and exceeding their profitability goals. Keep in mind the two key words are profit (how successful you are) and goal (how successful you intended to be). Actual performance must be compared with desired performance to be meaningful. Comparison of figures is even more comprehensible through the use of percentages. As you grow, percentages remain relevant, whereas absolute numbers sometimes lose their significance.

BALANCE SHEET

The balance sheet represents a fi-

nancial snapshot of your business at a particular moment in time. This (like all else) is particularly important evaluated against a similar period in time. Comparing this year's balance sheet to last year's is especially important in seasonal businesses. This allows you to determine whether your assets or liabilities went up or down and if this change in operations coincides with your objective. In addition, from a balance sheet we can determine if we are properly capitalized for off-season financial stress.

Most standard balance sheets reflect the status of your investment by subtracting total liabilities from total assets. (see figure 1).

The assets are on the left and reflect the goods and property owned, as well as claims against others yet to be collected (receivables, etc.). Under liabilities, all debts (due both short and

Figure 1: Balance Sheet

<u>Assets:</u>		<u>Liabilities:</u>	
Cash	5,000	Accounts Payable	20,000
Accounts Receivable	59,000	Notes Payable	10,000
Inventory	<u>4,000</u>	Accrued Expense	<u>4,000</u>
Current Assets	68,000	Current Liabilities	34,000
Property and Equipment		Long Term Debt	100,000
Trucks	200,000	Total Liabilities	134,000
Machinery	10,000		
Office Furniture	25,000		
Leasehold Improv.	<u>5,000</u>		
	240,000		
Less Accumulated Dep'n.	<u>40,000</u>	Stockholders Equity	
Net Property and Equipment	<u>200,000</u>	Common Stock	500
		Add'l. Paid In	
Total Assets	268,000	Capital	99,500
		Retained Earnings	<u>34,000</u>
		Total Owners Equity	134,000
		Total Liabilities and	
		Owners Equity	268,000

long term) are listed. Note that assets will always be in balance with your liabilities plus your stockholders equity (or capital account in the case of a sole proprietorship).

It is important to also understand the definition of current assets and current liabilities and the consequences of a poor current ratio. In general, current assets include cash, receivables and inventory. These are working assets in that they are constantly being converted to cash within a year from the balance sheet date. Inventory is used to produce receivables which, upon collection, become cash. Cash is used to pay operating expenses and debts.

Current liabilities generally refers to all debts that are due within the coming year. These include accounts payable (regular business creditors), notes payable (owed to banks and/or other lenders) and accrued expenses payable (salaries and wages, interest on borrowed funds, insurances, legal fees, etc.).

With this understood you can now compare current assets to current liabilities. This ratio is expressed by dividing current assets by current liabilities (see figure 2).

Figure 2: Current Assets Ratio

$$\frac{\text{Current Assets}}{\text{Current Liabilities}} = \frac{68,000}{34,000} = \frac{2}{1} = 2:1$$

Therefore for every \$1 of current liabilities, there are \$2 of current assets to meet the obligations. Most lending institutions will consider you a good short-term risk if your current assets/current liabilities ratio is in this neighborhood.

Once you've established the company as a reasonable short term risk, banks will generally lend on at least a 4:1 ratio of total debt to equity. Remember, equity is the difference between total assets and total liabilities. The company in figure one has built up equity of \$134,000 which would support financeable debt of \$536,000. Financeable debt will include short-term

(less than one year) capital requirements, last year's remaining long term debt service and this year's projected long-term (more than one year) debt needs. It is important to understand your financeable debt position to properly project your ability to meet obligations and expand your operation. With a working knowledge of your balance sheet, you are now ready for the operating budget.

OPERATING BUDGET

It is critical that the successful manager plan out his upcoming operating year prior to the close of his current season. Before completing this exercise one must have established goals relative to profit and growth. These goals must be specific, attainable and measurable. All too often, managers set goals which are unreachable or are fuzzy (i.e. happy customers, green lawns, etc.). Another common mistake is attempting to measure your success by tracking the number of production vehicles or the number of new branch offices. As discussed earlier, profit is the lifeblood of any business.

Establish a profit goal which is compatible with your growth objectives. Projected revenues must be based on acceptable cost per sale parameters. You must also clearly identify all of your fixed and variable expenses (see notes 2 and 4). The reader must understand completely how many \$ he can generate as a direct result of the \$ invested via selling expense. A firm understanding of the cost of every mailing piece, how many inquiries it will produce and the expected closing % on inquiries generated is essential. All projections should be based on historical data whenever possible. Only then can you accurately project how many \$ are available to be produced each round. This allows you to estimate billings to be produced by week so that you are never surprised by the volume of customers you have to service at any given time. It is by this exercise that one can determine number of vehicles needed to produce revenue projections which then leads to number of employees, etc.

Figure 3 illustrates an oversimplified operating budget. Normally, totals are broken down by month.

Figure 3: Operating Budget

	Total	% to Net Sales
Net Sales (1)	500,000	100%
Variable Costs (2)		
Chemicals	110,000	22%
Direct Labor	100,000	20%
Gas/Oil	20,000	4%
Total Variable Costs	230,000	46%
Marginal Profits (3)	270,000	54%
Fixed Expense (4)		
Building (5)	35,000	7%
Fleet (6)	50,000	10%
Selling (7)	35,000	7%
Administrative (8)	100,000	20%
Cost of Capital (9)	5,000	1%
Total Fixed Expense	225,000	45%
Pre Tax Profit (10)	45,000	9%

Business Planning and Control

The following notes refer to items in the operating budget, Figure 3.

- (1) Net Sales reflect billings by period. Net sales are exclusive of a reserve established for doubtful accounts (uncollectibles).
- (2) Variable Costs would only include those accounts which truly increase as billings increase. Chemical usage, direct labor (driver's payroll) and gas/oil expense are good examples.
- (3) Marginal Profit is the profit which is left after variable costs are covered. It is used to offset fixed expenses.
- (4) Fixed Expenses do not tend to shift in direct proportion with sales and would include administrative, selling, building and associated fleet costs.
- (5) Building Expenses would include rent, utilities, leasehold improvements, building supplies, repair and maintenance.
- (6) Fleet would incorporate depreciation and interest or lease expense along with fleet insurance, plates, tires, repairs and maintenance, annual refurbishing, etc.
- (7) Selling must reflect associated direct costs of promoting your business (i.e. yellow pages, brochure distribution and printing, newspapers, radio, television, billboards, etc.).
- (8) The Administrative category would probably include office expenses, insurances (general and healthcare), and indirect payroll (i.e. management and clerical).
- (9) Cost of Capital is the debt service on your working capital requirements (seasonal or otherwise).
- (10) Pre-Tax Profit is the bottom line from which you build your business.

PROFIT AND LOSS STATEMENT

Another very important report is the profit and loss statement. As discussed, the balance sheet was a picture of your investment at a given time. The

Figure 4: Profit and Loss Statement (Period 8)

	Budget	% to Net Sales	Actual	% to Net Sales	Variance
Net Sales	100,000	100%	92,000	100%	(8,000)
Variable Costs:					
Chemicals	22,000	22%	20,240	22%	1,760
Direct Labor	20,000	20%	20,000	21.7%	-0-
Gas/Oil	4,000	4%	3,680	4%	320
Total Variable Costs:	46,000	46%	43,920	47.7%	2,080
Marginal Profit	54,000	54%	48,080	52.3%	(5,920)
Fixed Expense:					
Building	7,000	7%	7,000	7.6%	-0-
Fleet	10,000	10%	10,000	10.9%	-0-
Selling	7,000	7%	7,000	7.6%	-0-
Administ.	20,000	20%	20,000	21.7%	-0-
Cost of Capital	1,000	1%	1,000	1.1%	-0-
Total Fixed Expense	45,000	45%	45,000	48.9%	-0-
Pre Tax Profit	9,000	9%	3,080	3.4%	(5,920)

profit and loss statement summarizes an entire period (i.e. month or year) and reflects a series of events within the scope of the period in question. Therefore, this statement is more like a movie. Your operating budget then becomes the script for your movie.

Figure 4 is a condensed profit and loss statement in a variance report format. Notice that actual \$ are compared to budgeted \$ and each dollar figure is then reduced to a percent of net sales. Analyze the percentages to quickly determine areas of improvement or areas which need immediate attention. One can see from Figure 4 that company XYZ should pay immediate attention to direct labor as the % to net sales is higher than projected, thus indicating some efficiency problems. Equally important is to note the adverse impact that falling short of your

revenues (net sales) has on your pre tax profit. Obviously, since your fixed expenses do not shift with your revenues, you contribute fewer dollars in marginal profit to offset fixed overhead.

BREAKEVEN POINT

The breakeven is the precise point at which sales volume shows neither profit nor loss. If you will consult the operating budget (figure 3) you will refresh your memory on variable and fixed costs. Based on this example, it was determined that net sales were \$500,000 and variable costs were \$230,000. We remember that by subtracting our variable costs from net sales, we determine our marginal profit is \$270,000. (see Figure 5). This means that for every \$1 in billings produced, 54¢ are contributed to offset fixed

Figure 5: Breakeven Point

Net Sales (1)	500,000	100%
Variable Costs (2)	230,000	46%
Marginal Profit	270,000	54%
Fixed Costs	\$225,000	
Marginal Profit %	.54	

= \$416,666 = Breakeven Point

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costs. If you divide the fixed costs (\$225,000) by marginal profit (54% or .54), the company can determine what volume must be sold to exactly achieve its breakeven point. In this case, XYZ company must produce \$416,666 to breakeven. Every \$1.00 in billings produced beyond this point should conceivably contribute 54¢ in profit. Therefore, in our example, if company XYZ had produced \$100,000 more in net sales, it would have added \$54,000 to their pretax profit position. This, of course, assumes that fixed costs do not increase to handle the additional business.

Finally, it is important for the prudent businessman to recognize his areas of weakness as they relate to business management. Should you find yourself lacking a good working knowledge of the aforementioned topics and concepts, you might consider several alternatives. Local universities provide classes which can be fairly useful. Several textbooks are available for a self-paced home study program. Also, consider consulting someone external to your organization, such as an accountant, banker or financial strategist for guidance.

+++

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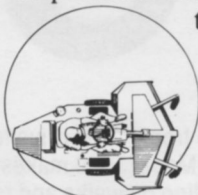
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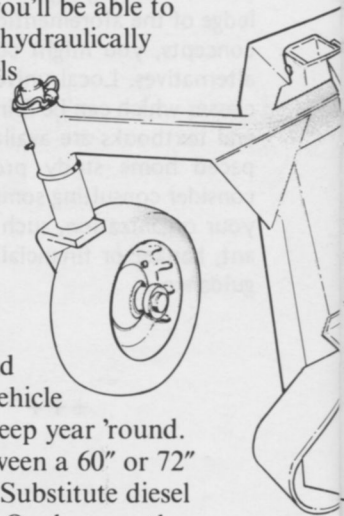
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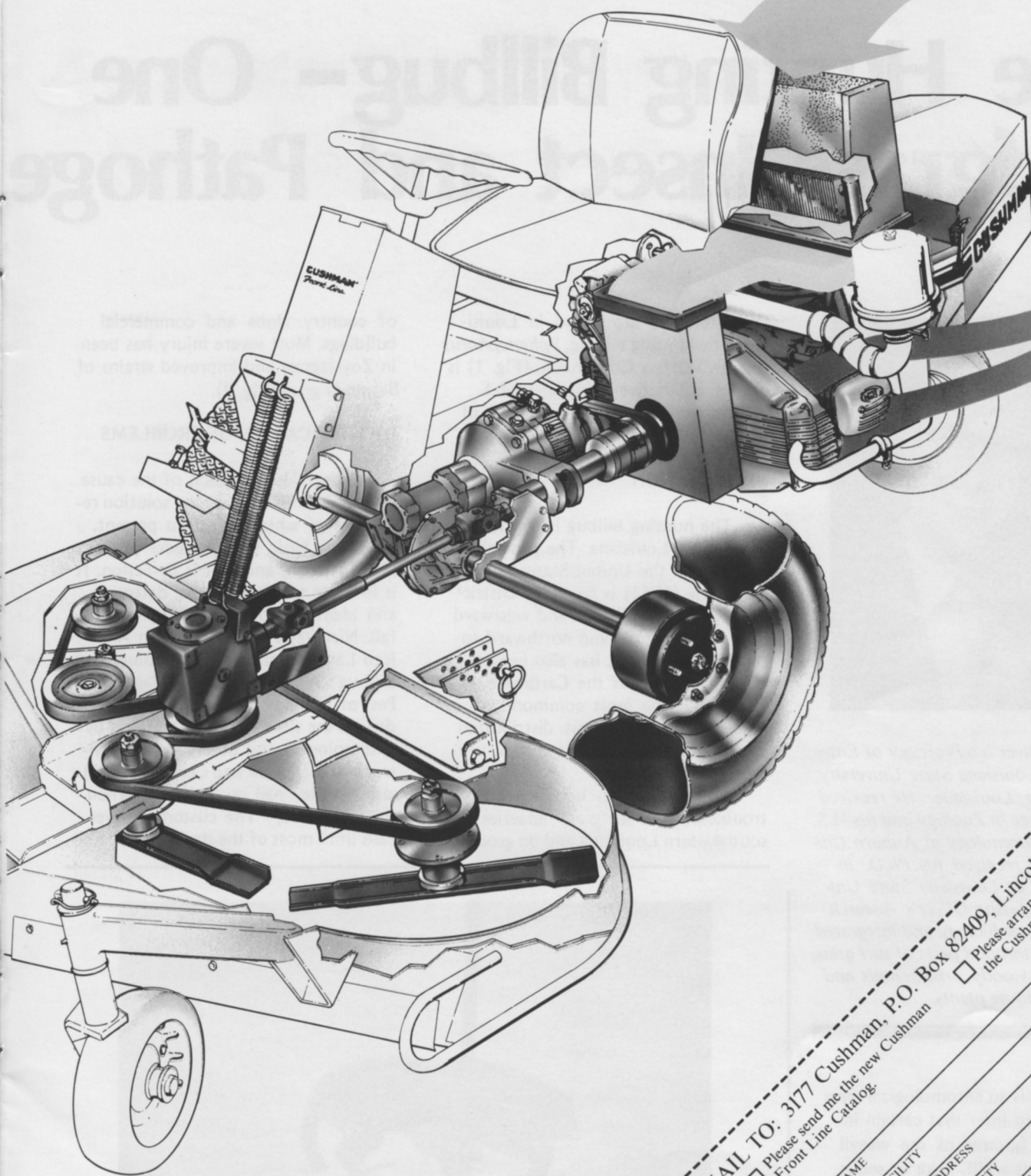
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The Hunting Billbug— One Turfgrass Insect and Pathogen



A. D. Oliver is a Professor of Entomology, at Louisiana State University, Baton Rouge, Louisiana. He received his B.S. Degree in Zoology and his M.S. Degree in Entomology at Auburn University. He received his Ph.D. in Entomology at Louisiana State University. Professor Oliver's research projects include biology and integrated control of arthropod pests of turf grass, shade trees, woody ornamentals and house-greenhouse plants.

Billbug is an entomological term used to infer that certain insects (groups of the weevil species) possess a bill, beak or snout, which is actually the rostrum; a rigid extension or snout-like prolongation of the head. At the end of this snout are the mouth parts which the billbug uses so well to feed and construct cavities in stems for deposition of eggs.

About 20 species of billbugs, *Sphenophorus* spp. (Coleoptera :

Curculionidae) are found in Louisiana. The hunting billbug, *Sphenophorus venatus vestitus* Chittenden, (Fig. 1) is one of about five subspecies of *S. venatus* and is an important pest of turfgrasses in the southeast.

DISTRIBUTION

The hunting billbug is distributed throughout Louisiana. The general distribution in the United States as given by Vaurie (1951) is from the District of Columbia to Florida and westward into eastern Texas and northward to southern Kansas. It has also been reported in some of the Caribbean Islands. It is the most common subspecies with the widest distribution of the five subspecies listed in *S. venatus*.

This billbug has been especially troublesome in turfgrass nurseries in southeastern Louisiana and on grounds

of country clubs and commercial buildings. Most severe injury has been in Zoysiagrass and improved strains of Bermuda grass (Fig. 2).

IDENTIFICATION OF PROBLEMS

Proper identification of the cause of a problem is basic to the solution regardless of which culprit is present. Only one basic step precedes proper identification, and that is detection. It is in these two basic steps, detection and identification, that many people fail. Niemczyk's (1983) title in American Lawn Applicator, "The Bluegrass Billbug: A Frequently Misdiagnosed Pest of Turfgrass" is well put and clearly depicts the situation so often faced by entomologists and others in pest control work. Derrick and Clayton (1982) also hit the "nail on the head" when they reported, "The customer never calls until most of the damage is done."



(Figure 1) An adult Hunting Billbug.

Among the Complex of n Problems

Lack of early and proper problem diagnosis has been, and appears to remain, a basic problem in sustaining healthy turf. A majority of this problem can be attributed to lack of training of people and the complexity of organisms that may infest or infect grasses. There is no quick-fix to learning the symptoms of injury and identification characteristics of the many causative organisms. Injury caused by the hunting billbug is often confused with that caused by several fungal pathogens as well as other herb-layer and soil insects e.g. white grubs and wireworms. There is no substitute for working on one's knees seeking samples for identification.

The hunting billbug lives in the herb-layer and down into the soil where they feed on grass foliage, stems and roots. The Bermuda type grasses, especially the Zoysia grasses appear to be preferred hosts, as this is where most severe infestations have been found. Nut sedges, crabgrass, signal grass, St. Augustine grass, centipede grass, and barnyard grass also serve as hosts of this billbug. Woodruff (1966) reported that wheat, corn, sugarcane, Pensacola Bahiagrass and leather-leaf fern were also hosts. Kerr (1964) reported the hunting billbug to be a serious pest of Zoysiagrass nurseries in Florida.

An injurious infestation may be characterized as causing the grass to turn brown and die in irregular elongated or rounded areas. Such areas of grass will be without sufficient roots to obtain water and nutrition or to serve as anchors to the soil. Manifestation of injury is much more pronounced during extended dry weather than when ample rainfall and fertilizer is available. Unlike the problems caused by white grubs, mole crickets, etc., where

the soil becomes soft and loose, the soil and turf remains much firmer. The higher the population of larvae which develop among roots in the soil, the greater the injury to the grass. Feeding on stolens, crowns and new leaf buds

characterize an infestation of adults and young larvae. Mobility by the legless larvae (Fig. 3) may affect severity of injury to the roots and stolens and may influence the usually small, irregular areas of dead grass. Billbug larvae



(Figure 2) Hunting Billbug injury to Bermuda grass. Dry weather enhanced the problem.

The Hunting Billbug

are usually found in the soil one to three inches deep among roots and runners.

To confirm which organism(s) caused a problem, specimen should be collected and properly identified. The billbugs, as adults and larvae, are difficult to identify to species and usually requires the help of taxonomic specialists.

Soil type influences success in finding larvae. Heavy clay soils make extraction more time consuming and less effective than when sampling well textured loam or sandy soil. Regardless of difficulty in getting adequate samples examined, persistence should prevail until positive determinations are made. Adult weevils are often found crawling across driveways, walks or along street curbs. The patio floor and walkways across higher elevations of the yard, as well as areas next to walls of buildings, are areas where adult billbugs often appear.

Adult weevil movement is most noticeable during mid-day hours in the late summer months. Large numbers of adults were observed moving away from Zoysiagrass recently treated with a

systemic granular insecticide for control of Rhodesgrass mealybugs. There appeared to be a strong repellent effect from the insecticide.

DESCRIPTION AND SEASONAL HISTORY

The hunting billbug closely resembles other species of *Sphenophorus* as adults and larvae. The adult weevils are generally black in color but may appear brown or gray because of dirt which adheres to the punctate thorax and striated elytra (wing covers). Woodruff (1966) reported that the pronotum is coarsely punctate, except for the "y" shaped area in the center and parenthesis-like (curved) marking on the side which are characteristics of the species. Some specimen are reddish brown. They are 8-10mm long with a conspicuous bill (prolonged head). They usually fend death for a short time when bothered and will cling tightly to a stem or leaf when one attempts to collect it.

Eggs (Fig. 4) are oblong and clear to creamy white in color. They appear in slits of leaf petioles or stems made by the adult female billbug. Kelsheimer

(1956) reported eggs to be deposited in leaf sheaths and at the top of the crown.

The larvae are white and legless with a brown head capsule. All stages of larvae closely resemble each other except in size. Last instar larvae reach 7-10 mm long. The large, and most posterior spiracle is a character of billbug larvae that differs from most other weevils. It is located in a somewhat flattened or scalloped area.

There is one generation of billbugs annually, though adults may be seen during most months of the year. Overwintering is by young adults produced in summer and early fall. Adult feeding and egg laying is most pronounced in the spring months with larval development extending into the summer. There are three to four larval stages before pupation. The average developmental time of five specimens from egg hatch through pupation was about 30 days.

CONTROL PROCEDURE

Once the cause of turfgrass injury has been identified and necessity for control determined, two basic considerations must be made :1. What materi-



(Figure 3) Four sizes of Hunting Billbug larvae extracted from soil in grass root zone.



(Figure 4) Hunting Billbug egg in grass stem just above the crown (partially extracted for vision).

al(s) are effective against billbugs and 2. How and when to apply the material(s) for best results. There are several chemical insecticides which could be used effectively (assuming proper use label is available for the area). Amaze or Oftanol are very effective soil insecticides. These insecticides were used very successfully at 1.5-2 lbs AI/A in 1983 to control billbugs in yellow nut sedge (chufa). Diazinon and Dursban, two insecticides used frequently for lawn chinch bug and caterpillar control, can also be used effectively for billbug and white grub control. Most effective control is obtained in spring and early summer. Application of these materials should follow thorough pre-watering of the area to be treated (at least equal to 0.5 inches of rain). Enough water to soak the thatch layer and upper four-six inches of soil will insure better penetration of the toxicants to the depth of grass roots where billbug and white grub larvae may be located. Niemczyk's (1983) presentation on the bluegrass billbug, in major parts, is applicable to the hunting billbug. Time of occurrence and severity of injury will vary, but the information depicts very closely the hunting billbug situation in the southeast. The hunting billbug problem will remain and probably increase in severity as more Zoysia and Bermuda grasses are used in landscapes. Very often when present, this insect will be within a complex

of other organism species that injure turfgrass.

LITERATURE CITED

1. Derrick, Steve and Gary Clayton. 1982. Turfgrass Diagnostic Techniques for Lawn Care Problems. *American Lawn Applicator*. III(6): 12-15.
2. Kelsheimer, E.G. 1956. The Hunting Billbug, a Serious Pest of Zoysia. *Proc. Fla. State Hort. Soc.* 69:415-418.
3. Kerr, S.H. 1964. Control of Hunting Billbugs. *Florida Ent.* 47(4): 269-270.
4. Niemczyk, Harry D. 1983. The Bluegrass Billbug: A Frequently Misdiagnosed Pest of Turfgrass. *American Lawn Applicator*. IV(3): 4-7.
5. Woodruff, Robert E. 1966. The Hunting Billbug, *Sphenophorus venatus vestitus* Chittenden, in Florida (Coleoptera:Curculionidae). *Florida Dept. of Agri. Ent. Circ.* No. 45. 2 pp.
6. Vaurie, P. 1951. Revision of the genus *Calendra* (Formerly *Schenophorus*) in the United States and Mexico (Coleoptera:Curculionidae). *Bull. Amer. Mus. Nat. Hist.* 98(2): 33-186.

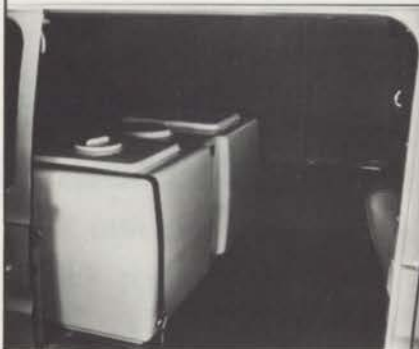
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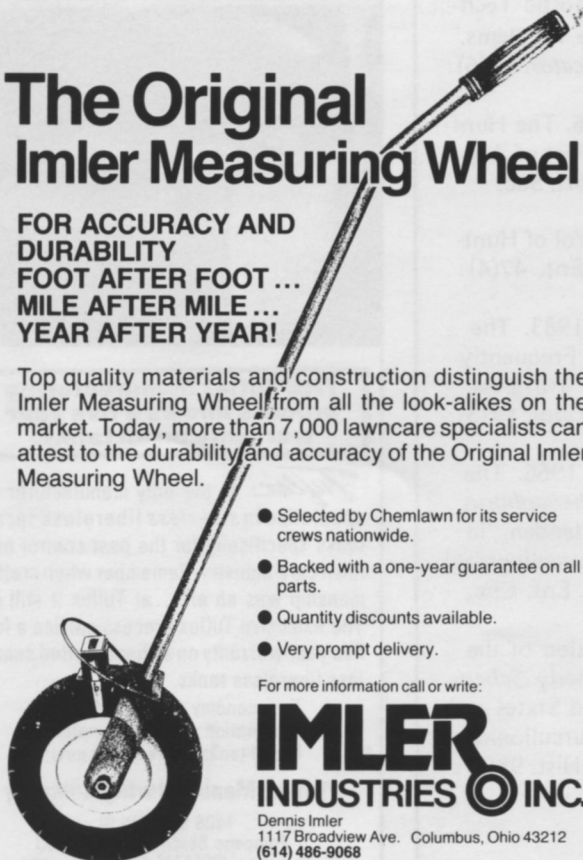
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Tests have shown that turf color and quality can be maintained with **higher** rates of micronutrient and **lesser** rates of nitrogen. BIG GREEN PLUS contains 15% nitrogen, 4% sulphur and 6% iron.

4. NON-STAINING (indilute state)

BIG GREEN PLUS has been shown to have non-staining properties when diluted at 3-4 ounces in 3-5 gallons of solution.

* 5. AVAILABLE IN BULK

Easy transport, less waste, no handling problems, safer to use when handled in bulk.

ASK ABOUT OUR SPECIAL CONTAINER PROGRAM.

CALL our toll free number 1-800-447-4131

or write for further information.



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