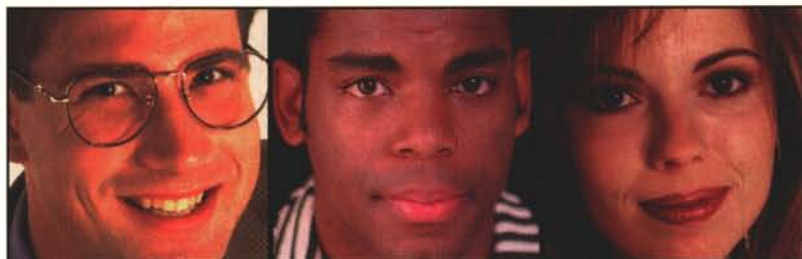


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A red telephone handset is shown in the foreground, resting on a keypad. The background features a world map. Overlaid on the keypad is the text "Do You Need Product Info Faxed To You Now?" with arrows pointing to the keypad buttons.

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many beneficial growth substances. By applying microorganisms to the soil and around the root shaft, you can bring about dramatic changes in plant growth and development.

In the rhizosphere (the soil zone adjoining living plant roots), a broad range of microorganisms produce cytokinin-like biostimulants along with

enzymes and amino acids. Hormones produced by microbes are called phytohormones. This group can be broken down into the following primary classes: auxins, gibberellins, cytokinins, ethylene, and abscisic acid. Secondary (but still important) substances in this category include amino acids, organic acids, carbohydrates, nucleic acid derivatives, vitamins, and other growth substances.

Bacillus subtilis is a good example of a

beneficial microorganism that helps produce PGRs. In an Auburn University study, it was shown to effectively increase root mass, nodulation, and early emergence, and to suppress diseases like *Rhizoctonia* and *Fusarium*.²

Humic substances

Humic acid is often included under the term biostimulants, because it triggers plant responses that are similar to hormonal ones. However, humic acid is such a complex molecule that it is difficult to determine whether a hormonal response is caused by the acid itself, or by one of its components. It's also possible that such responses are due to increased/improved availability of micronutrients and macronutrients.

Regardless, humic acid increases overall plant root growth, plant vigor, and general plant health. Adding humic materials can trigger a chain reaction which causes soil microorganisms to synthesize and excrete PGRs into the rhizosphere. This can dramatically improve plant growth and development.

Caution

Don't go overboard. Excessive amounts of biostimulants can actually cause reverse effects, such as stunted growth. Also, some products on the market intentionally reduce foliar top growth of turfgrasses.

A delicate balance must be maintained. Always use caution when mixing different products together. Each has different effects on your turfgrass.

For instance, one product works by temporarily inhibiting synthesis of gibberellic acids in turfgrass. This causes decreased elongation of turfgrass cells and internode length. If applied in conjunction with another product that's high in gibberellic acid, the original product's effectiveness would be negated.

References

1. Senn, T.L.; Aitken, J.B.; Acock, B. 1964. The Characteristics and Effects of Humic Acids Derived from Leonardite.
2. Backman, Paul A.; Brannen, Phillip M.; and Mahaffee, Walter F. 1994. Plant Response and Disease Control Following Seed Inoculation with *Bacillus subtilis*.

Kevin Hattori is director of communications for Growth Products, Ltd., P.O. Box 1259, White Plains, NY 10602; phone: (800) 648-7626; fax: (914) 428-2780; e-mail: KHattori@GrowthProducts.com.

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Lawn and Garden Tractors

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Lawn and garden tractors offer multiple combinations of convenience, versatility, and comfort, especially for large-acreage facilities with varied landscapes.

Today's lawn and garden tractors are equipped with front-mounted, low-emission, four-cycle gasoline engines that meet and exceed federal and state emissions standards. Engine sizes range from 11 to 26 horsepower, and benefits include greater fuel efficiency, quicker throttle response, and improved starting over older models.

Both lawn tractors and garden tractors are available with a variety of grass cutting decks. Deck size ranges from 30 to 60 inches, and consumers can choose from side-discharge, rear-discharge, and mulching models. Side- and rear-discharge decks can also be fitted with grass collection systems.

Many styles of lawn and garden tractors are equipped with automatic or shift on the go transmissions, all-wheel steering, headlights, tail lights and many other features and attachments. Today's models are durable, attractive, and powered by clean-running engines that produce significantly less smog-forming emissions than those produced as recently as 1990.

In colder climates where snow is a factor, dozer blades or snow throwing attachments expand the utility of lawn and

garden tractors. Optional snow cabs provide extra operator comfort in stormy conditions.

Garden tractors

Garden tractors are ideal for maintaining facilities with three to five acres or more. They provide a good option for consumers looking for equipment that can handle a variety of grounds care needs. Besides mowing, the multi-use tractors handle tilling, hauling, digging, moving soil, or removing snow. The versatile, heavy-duty workhorses feature low-emission engines with power ranges of 14 to 26 horsepower.

The main difference between a garden tractor and a lawn tractor is the garden tractor's ability to use either a front or rear power take-off (PTO) shaft to operate attachments. Garden tractors also use mowing decks that offer wider cutting capabilities compared to lawn tractors. Deck sizes range from 36 to 60 inches or more.

A garden tractor with a PTO can accommodate implements such as plows, tillers, disc harrows, row cultivators, small backhoes, bulldozer blades, front-end loaders, snow throwers, and other accessories. They can also pull carts or wagons to haul supplies.

Lawn tractors

A lawn tractor is a good choice when its primary task is cutting and collecting, or mulching grass for facilities with one to three acres of land. Engine sizes vary from 11 to 18 horsepower. Options include rear- and side-discharge grass collection systems, lawn sweepers, dump carts, and dethatchers. Mulching mower decks are also available. They save considerable time and expense, and they can reduce commercial fertilizer needs by as much as 25 percent.

Safety features

Important safety devices on lawn and garden tractors help prevent serious accidents. Most machines include a key safety start interlock switch to prevent accidental start-up. Machines with operator presence control (OPC) automatically stop the engine and powered attachments when the operator leaves the seat.

Safety features are often specially shaped and color coded so they can be identified by feel or quick glance. Safety guards protect against objects thrown by cutting blades. Most models also feature parking brakes and headlights.

Owners should always refer to the operator's manual provided by the manufacturer to read about important safeguards and special safety instructions before operating a lawn or garden tractor.

OPEI is a trade association whose membership is primarily composed of U.S. manufacturers of powered lawn and garden maintenance products, components, attachments, and services. For information, write: 310 S. Patrick St., Old Town Alexandria, VA 22314; phone: (703) 549-7600; fax: (703) 549-7604; or visit: <http://opei.mow.org>.

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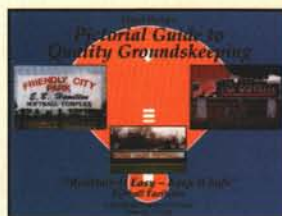
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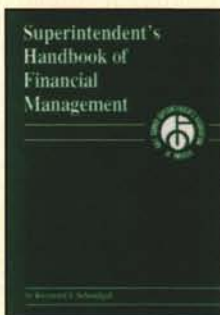
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Feature of the Month: Maintain It Easy(Keep It Safe), by Grounds Maintenance Services

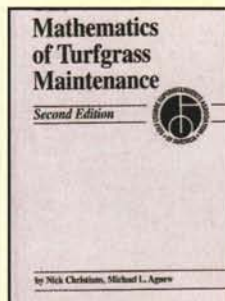
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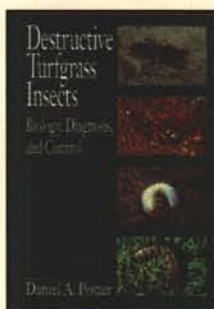


The Mathematics of Turfgrass Maintenance, 2nd edition,

by Nick Christians and Michael L. Agnew,

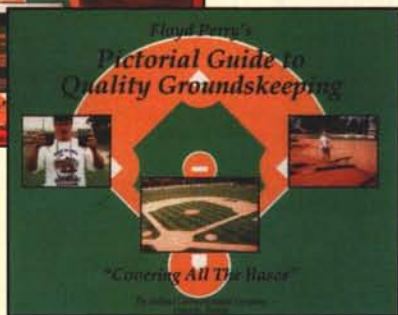
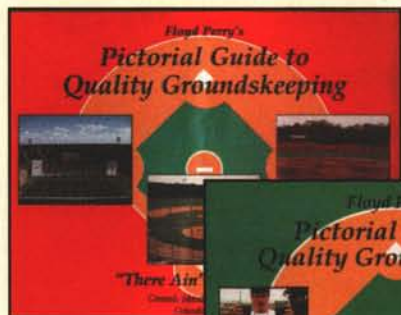
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ADVERTISERS' INDEX

Aerway/Holland Equipment	17
AgriBioTech, Inc.	40
Bannerman	15
Covermaster, Inc.	19
Cygnat Turf	10
First Products	16
Florida Turfgrass Association	24
Goossen Industries	14
Grasshopper Company	25
GreenNet Supplier Bookmark	22
JC Whitlam Mfg.	25
John Deere Company, The	26-27
Kromer Co.	25
Kubota Tractor Corp.	35
Milliken Chemical	33
NCH Corp./Opti-Gro	23,25
Ohio Turfgrass Foundation	28
Partac Peat Corp./Beam Clay	7
Roots, Inc.	5
Smithco, Inc.	20-21
Southern Laser, Inc.	34
Sportcourt, Inc.	32
Thomas Brothers Grass	28
Toro, Commercial Products Div., The	2-3
Toro, Irrigation Div., The	39
Turfco Mfg., Inc.	13
West Coast Turf	9

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