every insect on this page.
face this season?

armyworms and ants. This season, be sure to ask your local supplier for Diazinon. And put the biggest label in the business to work for you.

Ciba-Geigy, Ag. Div., Box 11422, Greensboro, NC 27409
Diazinon by CIBA-GEIGY
The biggest label in the business.

Circle 150 on free information card

CIBA-GEIGY
DERBY
Turf-Type Perennial Ryegrass

Setting a New Standard of Excellence

Derby is the dark green beauty which joined Manhattan and Pennfine on the "highly preferred list of ryegrasses." That was last year. Now Derby is setting a new standard of excellence.

In the eyes of many Golf Superintendents it reigns supreme among the turf-type ryegrasses today. Why? Because it performs! And a Superintendent knows that claims are great, but performance counts.

- Consistently performs better than other leading varieties from California to Florida
- Durable, dark green and has excellent mowing qualities
- Tolerates a variety of soils & responds rapidly to fertilization
- Germinates in a week (or even less) under ideal conditions
- Better-than-average heat and drought tolerance
- An adaptable and disease resistant cool-season turf grass
- An excellent record as a Southern winter grass
- Thrives when close-cut

INTERNATIONAL SEEDS, INC.
Dept. D • P.O. Box 168 • Halsey, Oregon 97348
(503) 369-2251 • TWX 510/590-0765
possible after a downpour, a drainage system providing runoff that keeps up with rainfall may be justified. In areas of high intensity rainfall, design drainage rates as high as 1/3-in. per hour or 8 in. in 24 hours (160 gpm per acre) are used.

In the example shown, a football field 160 by 360 ft., 10 lines 300 ft. long, spaced 16 feet apart are used. Each line would handle the flow from 16 by 360 ft., or 5,760 sq. ft. (or 0.13 acres). Water flow requirement is 21 gpm per line. For a slope of 0.04, 3-in. tubing is adequate. For a slope of 0.100 4-in. tubing is required.

While drainage is certainly a major factor in successful landscaping, its cost, in proportion to the overall construction budget, is small. Depending upon locality and conditions encountered, drainage cost represents only about 8% to 10% of a total golf course construction budget and only about 5% of a landscaping budget.

![Four-inch golf course drain in shallow trench and covered with gravel for rapid intake.](image)

### We're putting our brains together to save you money.

Take the dependable, reliable Rain Bird® RC-7A, RC-1230 and RC-1260—mix them up in any double combination—and what have you got?

Our brand new line of super economy controllers.

Here's how it works. Say you've got a light commercial or industrial (maybe even a large residential) job with 17 stations.

We'll give you a custom package complete with Heavy Duty Metal turf cabinet, one RC-7A and one RC-1230, for 18 total stations hooked in series (a little growing room never hurts). The savings per station for both you and your customer can be substantial. Nearly half the cost of one big 18-station controller.

So think about Rain Bird next time you need a custom controller package.

No sense paying more for rain than you really need to.

Rain Bird
Bringing new ideas to life.

7045 N. Grand Avenue, Glendora, CA 91740
Can a pesticide applicator get by without a knowledge of chemistry and still determine what pesticides are compatible in the spray tank? A knowledge of chemistry is helpful, but not essential if one masters a few basic rules.

A professional must know that the pesticides he mixes in water will retain their own identity and not react with each other. The following four rules and exceptions are helpful in determining tank mixes. However, if there is any doubt, simple tests using a glass jar can be used to check compatibility.

Green Industry applicators are concerned primarily with water mixes. Therefore, the need is to determine how each chemical reacts with water and how each chemical reacts with other chemicals in a water system.

Dr. Sartoretto is a member of the board of W. A. Cleary Corp., Somerset, NJ. He is also director of research and development for the company. Sartoretto has a Ph.D. in chemistry from Notre Dame.

All chemicals can be classed into three groups: cationic (positively charged), anionic (negatively charged), and nonionic (no charge). Positively charged chemicals (cations) attract negatively charged chemicals (anions). Nonions have no attraction to other chemicals, but their ability to mingle (solubility) with other nonions of similar structure must be recognized. In a water system, nonions that are soluble are termed hydrophyllic, and nonions that are insoluble are termed hydrophobic.

When cations and anions are mixed together they form salts. When large heavy cations and heavy anions come in contact, they form heavy salts which are insoluble and precipitate out of the mix. (Precipitate means to separate out of the solution or suspension, usually a visible solid dropping to the bottom of the container). Smaller cations and anions form smaller salts which can co-exist in solution without precipitating. The specific cations and anions that might cause problems are listed in the "Exception to the Rules" section of this article.

The basic principle of chemical compatibility is the classification of all chemicals, whether they be herbicides, fungicides, insecticides or fertilizers, into two groups: solubles and insolubles, because it's the physical properties not the chemical properties that determine compatibility 99% of the time.

Having then classified all chemicals into solubles and insolubles, I have devised a set of rules which when followed carefully permits the applicator to tank mix at will without incurring phytotoxicity. E.P.A. has devised key signal letters which alert applicators and inform them whether or not the product they are using is soluble or insoluble. These signal letters are as follows:

- **S** indicates solution
- **SP** soluble powder
- **EC** emulsifiable concentrate
- **WP** wettable powder
- **F** flowable

The S, SP, and EC are classified as solubles; whereas, the WP and F are insolubles.

The amount of water sprayed per 1000 sq. ft. is another variable that requires some explanation that will affect the pesticides that should or should not be mixed in the spray tank. For example, an applicator will use 3 to 5 gallons per 1000 sq. ft. on greens and tees, and only ½ to 1 gallon per 1000 sq. ft. on fairways, depending upon whether he is using a mist blower or a spray boom.

By far, the largest group of chemicals are the insolubles. Most technical chemicals are, for all practical purposes, insoluble in water. The
No. 1 CHOICE OF LAWN MAINTENANCE PROFESSIONALS AND PERFORMANCE SEEKING HOME-OWNERS

MOWS AND BAGS WET OR DRY GRASS WITHOUT CLOGGING!

Seeking Performance... Power... Durability? GET A SENSATION!

With exclusive valve rotator, replaceable wheel bearings, mag-aluminum cast deck, patented air lift blade with balanced fly wheel for bagging wet grass without clogging... SENSATION more than ever the No. 1 Choice.

No. 1 features that make the No. 1 difference for you!

WRITE TODAY FOR MORE INFORMATION ON SENSATION MOWERS...

THE SENSATION CORPORATION 3601 North 16th Street • Omaha, Nebraska 68110
manufacturer has three options in preparing the pesticide in a sprayable form. (1) He can mix it with a wetting agent and other inerts such as free-flowing and non-dusting agents, and then he will air-mill the mixture to obtain sub-micron size particles so that it will not clog the spray nozzles. He will then call this mixture a wettable powder. (2) He can dissolve the pesticide in an organic solvent (usually aromatic spirits such as xylene or aromatic kerosene), add an emulsifier to it so that it will emulsify in water to give a permanent milky dispersion in water, and will call this solution an emulsifiable concentrate. (3) He can also disperse the pesticide in water or water soluble solvent with wetting agent and stabilizers then sand mill or ball mill this mixture into a flowable.

Although it is rare, one can encounter all three forms of a single pesticide: EC, WP, and F. Wettable powders and flowables are safer to use but not as fast acting as emulsifiable concentrates. The aromatic solvents used in preparing EC’s are notoriously phytotoxic. This is why it is important to confine EC’s but are rarely used. The EC’s used with low gallonage spray invite phytotoxicity.

To guard against such an occurrence we formulate Rule Number 1. Never tank mix emulsifiable insecticide concentrates. Not only will you incur phytotoxicity from the aromatic solvent sitting on the grass blade, but the insecticides, according to the labels, must be sprayed with large volumes of water (10 to 30 gallons), sometimes followed up with recommendations to water them in heavily to get them down to grubs. The wettable powder and flowable formulations will not burn but must still require watering for grub proofing. However, they can be used with a limited amount of water for surface treatment and can be treated as insolubles.

As I have said before, the largest category are the insolubles. Rule Number 2 states that all insolubles can be tank mixed without incurring phytotoxicity provided the products are sprayed at recommended rates. This permits the tank mixing of a tremendous variety of chemicals. Most important of all, it allows the applicator to spray three, four or more chemicals at the same time. The advantages are unbelievable if he explores the possibilities.

Broad spectrum control, where money is no object, is a must. The applicator should not rely on a single chemical to control a target disease. Follow the example of the pathologists at the various agricultural colleges. Note how they are mixing two and three different fungicides in their experimental plots in an attempt to achieve better control.

The trend that I have tried to pioneer over the last 20 years is precisely in this direction and many competitive manufacturers have joined in. More recently, with the advent of systemic fungicides the broad spectrum mixture has assumed brighter and newer horizons because of the longer residual control attainable with the addition of a systemic along with one or two contact fungicides in the spray tank.

Prior to the systemics, it was an accepted fact that contact fungicides did their job on the grass blade and in the thatch and were dissipated within two to three days. A good contact fungicide will kill germinating spores at a few parts per million. It is usually sprayed on the grass blade at about 5,000 parts per million. With the present-day irrigation and mowing practices, it doesn’t take more than two to three days to get down to a dilution below the effective five parts per million.

In hot, humid weather accompanied by sporadic showers, an applicator had to spray twice a week, otherwise his grass would go unprotected the latter part of the week. This is not the case since the advent of systemics. They hydrolyze in the soil to knock down the fungus population, not only in the soil but also within the grass blade by diffusion through the root system, thereby giving extended protection.

Continues on page 31
A BEAUTIFUL RYE.

There's no doubt about it. REGAL is the new turf-type perennial ryegrass that combines color, vigor and density for an elegant turf.

REGAL's dark green, fine-textured leaves look beautiful alone, or blend well with other turf-type ryegrasses. It has excellent tillering characteristics, and during periods of transition with bermudagrass, helps to maintain a lush, green, uniform turf.

And REGAL cuts clean, for a beautiful lie on tees, greens, fairways and roughs. Without ragged edges, or grainy areas.

REGAL — bred for rapid germination, exceptional vigor, density and persistence. Good disease resistance, too.

If you'd like more information on REGAL, contact North American Plant Breeders. P.O. Box 2955. Mission, Kansas. 66205

First in the science of seeds.™

Circle 137 on free information card
BS100
2- or 4-wheel drive.
12 hp. 2 cyl.
Designed for grass cutting, vegetable gardens, and general estate maintenance. For home owners, this tractor is a step up from riding mowers. Can use mid-mount or rear-mount mower, rotary tiller, plow, disc harrow, rear blade.

BS100D
4-wheel drive.
16 hp. 3 cyl.
Similar to BS100, but bigger engine offers more pulling power. Can handle all the same implements as the BS100DT. Good tractor for landscapers, nurserymen, and other commercial users requiring a tractor to handle variety of materials.

BS100DT
4-wheel drive.
16 hp. 3 cyl.
Our biggest selling tractor. Small enough for grass cutting and general work around private homes. Strong enough for a wide variety of commercial applications, especially park maintenance, nurseries, landscape contractors. Implements include post hole digger, front blade, trencher, front-end loader, backhoe, snowblower, as well as all those listed under BS100.

BS100DT
4-wheel drive.
17 hp. 2 cyl.
Works as mowing tractor with turf tires. With 2-wheel drive it is versatile chore tractor on large farms. For farm or industrial use where ground is soggy, we recommend 4-wheel drive for maximum traction. Category 1 3-point hitch can handle plow, cultivator, disc harrow, rotary tiller. Also a wide range of earth moving and excavating implements. Rental operators will find this model in great demand.

L185
2- or 4-wheel drive.
20 hp. 3 cyl.
Works as mowing tractor with turf tires. With 2-wheel drive it is versatile chore tractor on large farms. For farm or industrial use where ground is soggy, we recommend 4-wheel drive for maximum traction. Category 1 3-point hitch can handle plow, cultivator, disc harrow, rotary tiller. Also a wide range of earth moving and excavating implements. Rental operators will find this model in great demand.

L245
2- or 4-wheel drive.
25 hp. 3 cyl.
This model has many crop applications, especially vegetable grow and orchard work. A range of implements available, including post hole digger, front blade, box scraper.

L245H
2-wheel drive.
25 hp. 3 cyl.
New high-clearance tractor, ideal for special crops such as vegetables and tobacco. Provides ample 22" ground clearance plus an uncluttered off-set operator's platform for excellent visibility.

Have you noticed the color of our Kubota tractors? Orange. Every one of them. It's our way of making it easy for you to choose a good tractor. Now all you have to do is pick an orange. That way you won't get a lemon.

In the 12 to 55.5 hp range, no one offers as many models as Kubota. And all our mid-size Kubotas give you the qualities that separate real tractors from the lightweight garden variety.

All Kubotas have water-cooled diesel engines, which are designed with more cylinders than many competitive models. Standard equipment on all models includes rear PTO and a 3-point hydraulic hitch that accommodates a variety of implements.

For more information, write or call us. Better yet, see your Kubota dealer. He knows more about how...
An orange.

285
4-wheel drive. 30 hp. 4 cyl.
Cylinder diesel engine provides lots of smooth power. Built to accommodate a long list of implements, including tine rear-mount power, tillers, disc plows, box scraper, front blade, front loader, ripper, plow. Good tractor for dairy farms. Also wide application for institutional or governmental grounds maintenance. With front loader, it is excellent machine for dairy farms.

L295DT
4-wheel drive. 30 hp. 3 cyl.
Will outpull many larger farm tractors that only have 2-wheel drive. Can handle most medium-sized Category I farm implements. Also, earth moving capability makes it suitable for general building contractors. Outstanding fuel economy for its size. Draft and position control is standard.

L345
2-wheel drive. 34 hp. 4 cyl.
Brand-new model designed to fit into popular horsepower range. 4 cylinders let it run more smoothly than many competing models. Fine all-around performer as a home tractor on large farms. Handy for general contractor because it doesn't require heavy-duty trailer to haul it to construction site. Live rear PTO, draft and position control, power steering are standard on this model and all larger tractors.

L395DT
4-wheel drive. 55.5 hp. 6 cyl.
Our big brute. Tremendous pulling power for its size and weight. Works beautifully as primary tractor on smaller farms. Fine for land where traction is critical. Ideal for building contractors who start work in the North as soon as frost is out of the ground.

M4500DT
(not shown)
2-wheel drive. 47.5 hp. 6 cyl.
Good number one tractor for small farms, especially vegetable crops. Also excellent for many types of small to medium excavating work. 6 cylinders provide smooth torque. Quiet running. Economical to operate. 16 forward gears supply wide range of ground speeds to match many different implement uses.

HELP! To help me pick an orange, please send free spec sheets on the following Kubota models:
1. (Model No.)
2. (Model No.)
3. (Model No.)

Mail to: Advertising Department
Kubota Tractor Corporation, 550 W. Artesia Blvd.
P.O. Box 7020, Compton, CA 90224

NAME
ADDRESS
CITY
COUNTY
STATE
ZIP
AREA CODE
TELEPHONE NUMBER

For ad on following page circle 116 on free information card

KUBOTA

We’re looking for work.

Circle 173 on free information card
Elanco's new Surflan® gives you months of weed control for only pennies per 1,000 sq. ft.

Where ornamentals are grown, and annual grasses and broadleaf weeds are a problem Surflan delivers outstanding weed control.

Does your herbicide measure up to Surflan?

<table>
<thead>
<tr>
<th></th>
<th>Length of Control</th>
<th>Economical</th>
<th>User Safety Category</th>
<th>Ease of Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surflan®</td>
<td>6-8 mos.</td>
<td>$21-$43 per acre</td>
<td>Category 3 Caution</td>
<td>Surface applied Spray</td>
</tr>
<tr>
<td>Other Herbicides</td>
<td>Does yours last as long?</td>
<td>Up to $90* per acre?</td>
<td>Caution 3 Warning 2 or Danger 1</td>
<td>Does yours need mechanical incorporation, or immediate rainfall or irrigation?</td>
</tr>
</tbody>
</table>

*Based on manufacturers suggested retail prices.

Maybe you should compare your herbicide with Surflan in some other ways too.

Whenever annual grasses and most broadleaf weeds are a problem in ornamentals depend on Elanco's new Surflan for months of weed control at a reasonable price.

Another of Elanco's dependable weed control crew.

---

Elanco Products Company
A Division of Eli Lilly and Co.
Dept. E455
Indianapolis, Indiana 46206 U.S.A.