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Turf Grass TRENDS

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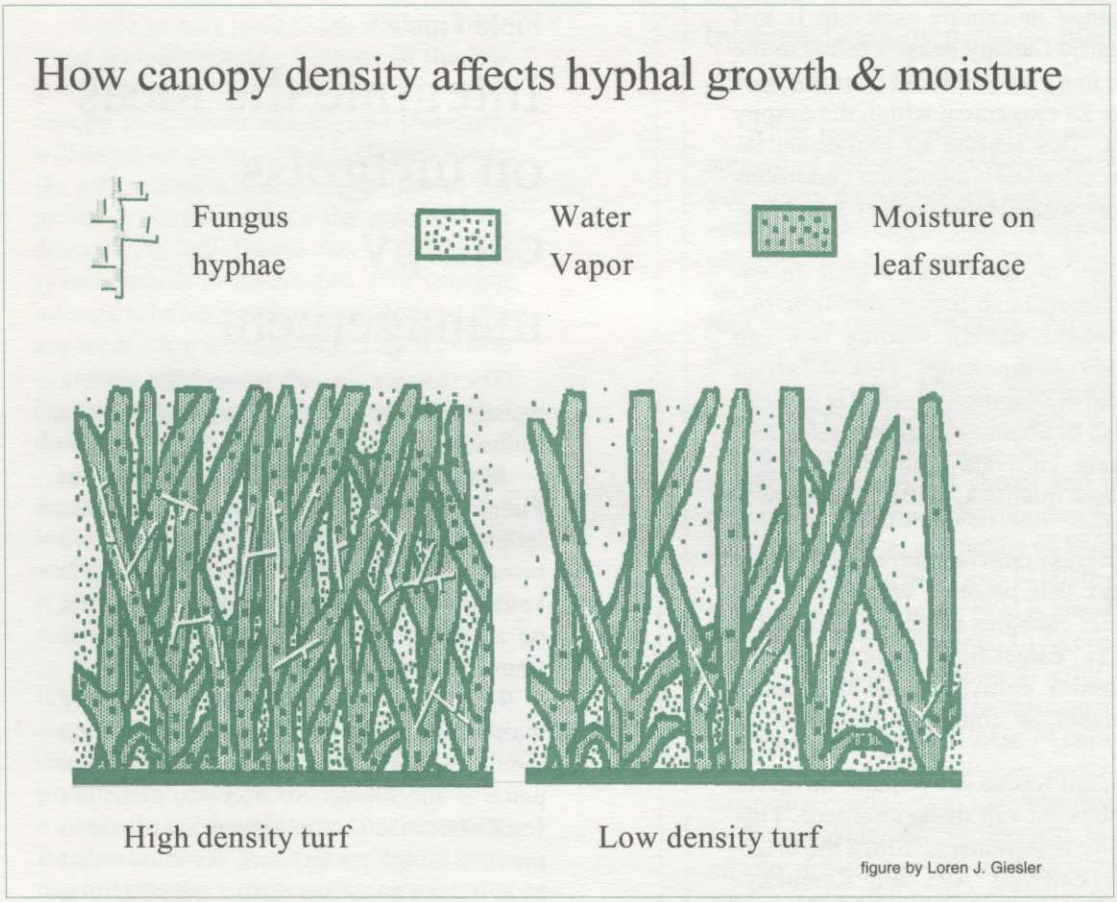

IN THIS ISSUE

The turfgrass canopy and its environment

by Loren J. Giesler and Dr. Gary Y. Yuen
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A canopy is often thought of as the leafy portion of a tree or shrub, but turfgrasses can also be thought of as having a canopy. Picture yourself in a typical forest canopy. You are surrounded by living plant tissue. Notice how cool, dark, and damp it is within the canopy even though it may be a hot, dry, sunny day. The forest foliage influences the environment within the canopy (the micro-environment) and causes conditions within the canopy to be greatly different from outside of the canopy, or the ambient environment.

In a similar manner, the turfgrass canopy is formed by overhanging foliage. Micro-environmental conditions within the turf canopy can vary markedly from ambient conditions and can greatly affect the activity of organisms (i.e. turfgrass diseases). Little is known, however, of what effects turfgrass management practices have on the canopy environment.

Changing the canopy

The physical structure of turfgrass canopies is regularly altered by management practices, and therefore the canopy micro-environment is also changed. An obvious alteration is mowing, which affects the height of the canopy. As the height of a canopy is lowered, air mixing within the canopy extends to the soil surface. This results in drier canopy conditions in lower cut canopies.

A more subtle change in canopy structure is turf density or canopy density. Canopy density refers to the total number of blades in a given area. As the density of a canopy increases, the air movement within the canopy becomes more limited. This limited air movement results in much different micro-environmental conditions as compared to a canopy with greater air movement (i.e. low density canopy).

For turf species such as tall fescue which do not spread by rhizomes (underground lateral stems) or stolons (above-ground lateral stems), seeding rate can directly impact the density of the canopy. This will affect other species as well, but the duration of effect is limited. Canopy density can also be altered by cultivar selection. All species of turf have cultivars with different and unique qualities. Of these qualities, density and growth habit are normally listed.

In recent years, turfgrass cultivars have been developed by plant breeders that produce very dense and compact canopies. These canopies are chosen primarily for aesthetic reasons, as "carpet-like" canopies are desired. Many of the newer cultivars also have more delicate, less rigid blades as compared to the older releases.

In the Great Plains, tall fescue is a popular turfgrass and is selected for its drought and shade tolerance. This turf also has low fertility requirements. Since the original release of tall fescue cultivars 'Alta' and 'Kentucky-31' in 1940, many cultivars have been developed. Tall fescue cultivars are classified into three main groups (Tall, Medium, and Dwarf). The tall cultivars are represented by the original releases and are sometime referred to as forage-type tall fescue cultivars. While it is not well documented, the tall cultivars are associated with low density canopies and have upright growth habits and do not generally produce dense canopies unless seeded at high rates at the time of establishment. This association is thought to be due to the input of resources available to the plant into top-growth instead of root-growth or shoot production.

The medium and dwarf cultivars are the newer released cultivars and generally produce low growing and dense canopies. This reduces mowing frequency and decreases lawn refuse. Currently, there are over 100 tall fescue cultivars available to select from. New, dense cultivars have been suggested to have increased disease problems and this has been confirmed for brown patch disease by research conducted at the University of Nebraska.

Field Tips

Integrate the ideas on turfgrass canopy management

The integration of these ideas into a management system is demonstrated in the following example.

Mark is a turfgrass manager in the Great Plains. He will be establishing turfgrass into an area which has been known to have brown patch problems. (Even if he doesn't know that brown patch is present this would be a safe assumption, as the pathogen is found nearly everywhere.)

He also anticipates that this turf will be maintained under high maintenance, and therefore, has a higher potential for brown patch in the future. He wants to plant tall fescue because he can reduce his inputs to produce a high quality turf. He knows that by selecting a cultivar with a tall structure, a canopy with reduced density will be established. He can plant at a seeding rate of 6 lbs/1000 ft^2 or less.

Brown patch disease and tall fescue as a model study system

Brown patch is the most destructive disease of tall fescue from the Southern U.S. through the Great Plains. Also known as Rhizoctonia blight, this disease is caused by the fungus *Rhizoctonia solani*, which is a widespread inhabitant of soil and thatch. Typically, the disease causes large brown patches which can range from a few

inches to over two feet in diameter. Individual diagnostic lesions on the blades are irregular-shaped, bleached areas with dark margins. Spread of the disease occurs through the movement of infected grass blades or growth of the fungus through the canopy by hyphae, or thread-like strands.

As with all turfgrass diseases, infection by the brown patch fungus and the development of symptoms are affected by environmental conditions. Environmental conditions which favor growth of the fungus in a canopy are warm temperatures (night temperatures above 60° F and daytime temperatures above 85° F) and high relative humidity or free leaf moisture.

Disease development is also determined by the influence of weather on the host. In the Great Plains, the disease typically occurs during the hot summer months, when the cool season grasses are stressed. In contrast, brown patch disease in the southern U.S. occurs to a greater extent in early spring and fall, when warm season grasses are more stressed by cool temperatures. We have found in our research that the severity of brown patch disease development during these favorable weather periods can be reduced by cultural practices.

Increased canopy density: positive attribute or potential problem?

While much breeding effort has gone into the development of compact and dense tall fescue cultivars, the question of whether or not this is a positive attribute does arise. Studies comparing cultivars of tall fescue for their susceptibility to brown patch disease have been conducted at many locations within the U.S. One piece of information lacking in many of these reports is a canopy density measurement.

In our research, canopy density is quantified by extracting plugs from the canopy using a standard cup cutter. These plugs are then taken back to the laboratory where numbers of individual shoots and blades per shoot are counted. Multiplying shoot number by the number of blades per shoot gives an estimation of blade density for a given canopy. In studies involving 14 tall fescue cultivars, we find that susceptibility in the field is greatly affected by canopy density. (See figure on page 5.) As canopy density increases so does brown patch disease severity. This relationship has also been demonstrated in agronomic crops.

We have also tested these 14 cultivars for their susceptibility to brown patch disease under uniform micro-environmental conditions in a growth chamber, and found them to vary considerably. In the field, however, the effects of canopy density appears to mask differences among cultivars in susceptibility determined in the growth chamber. In fact, levels of brown patch disease are higher for the resistant cultivar as a group than for the susceptible cultivars.

We also tested seeding density, as another cultural practice which can greatly modify the canopy environment, for its effects on brown patch disease. Experiments with a tall type cultivar 'Fawn' showed that increasing seeding rates result in increased brown patch disease up to two years into a planted area.

In a study in which tall fescue 'Fawn' was seeded at 2, 6, and 10 lbs/1000 ft^2, brown patch disease severity increased with increasing seeding rates. In the first year of establishment, twice as much disease activity was observed in the highest seeding rate as compared to the lowest seeding rate. In the second year, disease severity was approximately 20% lower in the low density canopy than the high density canopy.

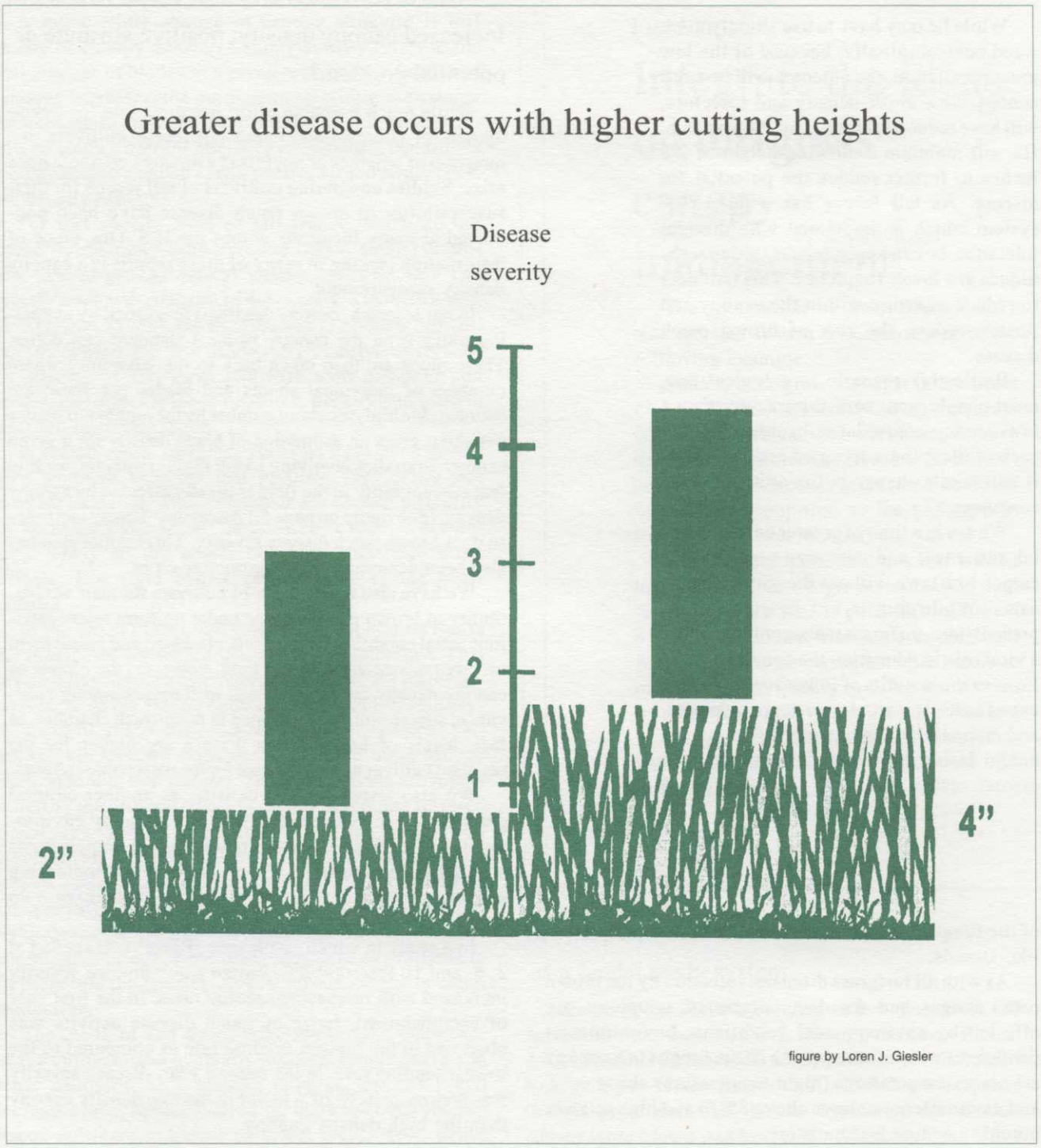
While he may have to use slightly more weed control initially, because of the low grass population, the outcome will be a full canopy with lower density and therefore, will have reduced potential for brown patch. He will maintain a mowing height of 2.5 inches to further reduce the potential for disease. As tall fescue has a deep root system which is associated with drought tolerance, he can apply deep watering techniques at a lower frequency. This will help to reduce moisture within the canopy and further reduce the risk of brown patch disease.

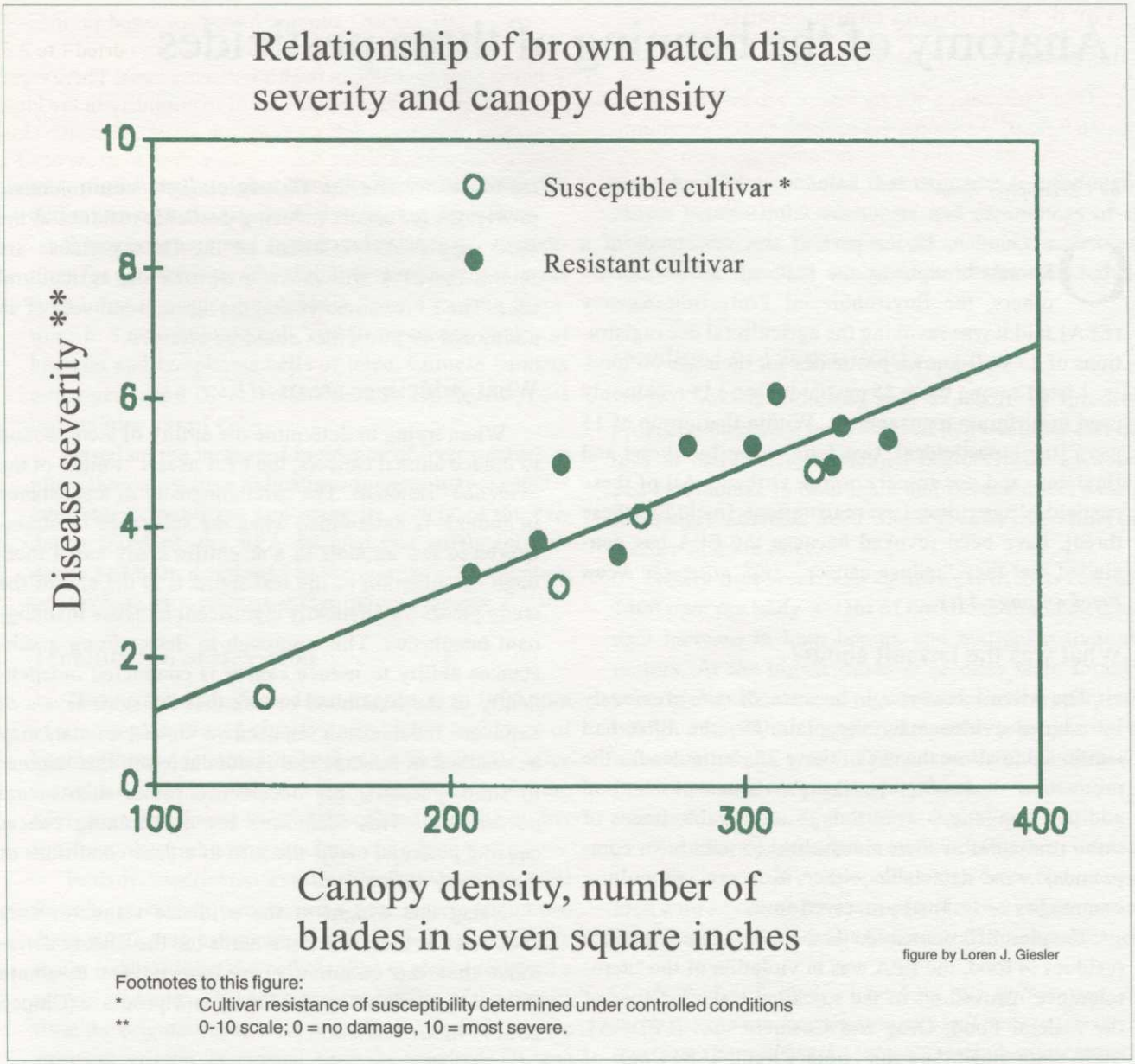
While this scenario is a logical one, most people want something better than a low-density, coarse lawn. In order for ideas such as these to be accepted and practiced, it will take a change in the attitude of the consumer.

We are in a time of greater environmental awareness and everyone would like a carpet-like lawn without the use of chemicals. While this is not possible at the present time, turfgrass managers could play a vital role in education the consumer public as to the benefits of lower seeding rates, use of cultivars with lower canopy density, and maintaining a moderate to low cutting height during the height of the brown patch disease season. ■

Why do high density canopies sustain increased brown patch disease?

One explanation for increased brown patch disease in high density canopies is that the micro-environmental conditions within those canopies are more disease-favorable. By measuring conditions within the canopies of low and high density turfs, we have found that high density tall fescue canopies have prolonged periods of moisture (See figure Page 1.) Leaf surfaces dried 1 to 2.5 hours later each day in the high density turfs. There were also more extended periods of high humidity in the high density canopies due to reduced air movement. This gives the brown patch fungus more time to grow across leaf surfaces and to infect tissues. Temperatures were found to be similar for low and high density turfs.





Footnotes to this figure:

* Cultivar resistance of susceptibility determined under controlled conditions

** 0-10 scale; 0 = no damage, 10 = most severe.

Another way in which high density turfs affect disease development is by increasing the potential for spread of the brown patch fungus within the canopy. *Rhizoctonia solani* is limited to spreading by hyphal growth or dispersal of infected grass blades through mowing. The fungus does not produce spores and therefore, does not spread by serial means. Growth through the canopy is limited by the proximity of healthy leaf blades surrounding a leaf blade infected with the fungus or merely harboring the fungus on its surface. We observed the brown patch fungus to spread from leaf blade to leaf blade or from plant to plant more rapidly in high density turfs because deaf blades are closer together.

Increased cutting height; positive attribute or potential problem?

The common recommendation, in regards to mowing height, is to increase cutting heights during portions of the year when the turf in under stress. For tall fescue, this is in the hot mid-summer months, also during which the brown patch fungus is most active. By increasing cutting heights at this time, the turf canopy environment is caused to be more disease-favorable. The figure on page 4 shows the effect of cutting height on brown patch disease. This effect has been shown not only in our research, but also has been reported at many other locations. ■

Anatomy of the banning of three pesticides

by Christopher Sann

On October 12, as part of the settlement of a lawsuit brought by the State of California, and others, the Environmental Protection Agency (EPA) said it was revoking the agricultural use registrations of 25 well-known pesticides for their use on food.

Listed among those 25 pesticides were 15 commonly used in turfgrass management. Within that group of 15 were [three pesticides], two fungicides, Iprodione and Bayleton, and one insect control, Orthene. All of these pesticides' agricultural use registrations, [including these three], have been revoked because the EPA has concluded that they "induce cancer". (*Ed. note: see News Brief on page 11.*)

What was the lawsuit about?

The lawsuit was brought because, despite previously introduced evidence by the plaintiffs, the EPA had continued to allow the use of these 25 pesticides for the production of food under the provisions of its food additive regulations even though measurable traces of these pesticides or their metabolites (break-down compounds) were detectable either in a raw agriculture commodity or its final processed form.

The plaintiffs contended that, by allowing detectable residues in food, the EPA was in violation of the "zero-tolerance" provisions of the so-called Delany clause of the Federal Food, Drug and Cosmetic Act (FFDCA). They maintained, and the Ninth Circuit U.S. Court of Appeals agreed that the Delany clause barred the establishment of food additive regulations, tolerances, or exceptions for residues of any pesticides that had been demonstrated to induce cancer, no matter how small the risk.

What happened to these pesticides?

In the announced settlement of this lawsuit, the EPA agreed to cancel the food additive tolerances that had previously existed for the listed 25 pesticides. In the process they revoked the use registrations for certain agricultural uses of each pesticide. Additionally the EPA agreed, over the next five years, to examine all of its remaining pesticide food additive regulations, or so-called 409s, to determine whether any of the remaining tolerances violate the Delany clause's zero-tolerance provisions for cancer inducing pesticide residues in the food supply. As violations of the Delany clause are found, the EPA will move to revoke the agricultural uses. The EPA estimates that the agricultural uses of an additional 49 pesticides could be affected.

What guidelines are used?

When trying to determine the ability of a compound to induce animal cancers, the EPA uses a "weight of the evidence" standard. The carcinogenisity of a substance in animals is determined when the substance is administered to test animals in a scientific study and a thorough examination of the test subjects at the end of the study yields a statistically significant increase in malignant neoplasms. This approach to determining a substances ability to induce cancer is conducted independently of the likelihood or risk that the same levels of exposure and duration imposed on the test animals may be reached in humans and is conducted in this manner to show potential for occurrence rather than actual occurrences. This technique for determining cancer causing potential meets the zero tolerance conditions of the Delany clause.

Using this weight of the evidence standard, tests conducted to meet these standards led the EPA to determine that the commonly used pesticides acephate (Orthene), triadimefon (Bayleton), and iprodione (Chipco 26019) induce cancer.

What were the test results?

Acephate or Orthene

After tests were conducted using acephate, the EPA concluded that "exposure to acephate results in the induction of malignant heptocellular carcinomas in female CD1 mice".

Both male and female CD1 mice were exposed to three levels of acephate: 50, 250, 1000 parts per million (ppm) of body weight, over a two year period. Of those test animals that were still alive at the end of the test, only the female mice that had been exposed to the 1000 ppm dosage showed signs of increased incidence of heptocellular and hyperplastic nodules of the liver that

were significantly higher than the historical range for that strain of test animals at that testing laboratory.

When acephate was tested under laboratory conditions for genotoxicity (the ability to mutate genes) it was found that exposure to acephate caused genetic mutations in Salmonella, E. coli, and S. cerevisiae strains of bacteria and lymphoma cells of mice, Chinese hamster ovary cells, and DNA recombinant in Saccharomycces (unicellular yeast) cells.

Based on the increased incidence of liver cancers in mice, the six positive indications for genotoxicity under laboratory conditions, and using its weight of the evidence standard, the EPA decided that sufficient evidence had been developed to warrant the identification of acephate as a substance that induces cancer.

Triadimefon or Bayleton

Testing results indicated that exposures of 1000 ppm of triadimefon caused significantly higher incidence of heptocellular adenomas in both male and female mice than the control animals and that the incidence of these adenomas was found to be dose related, i.e. the higher the dose, the higher the incidence of adenomas.

Initially, triadimefon was not thought to be responsible for this increase in tumors, but a peer review committee determined that information contained in a pathology report indicated that the pathological evidence required a second evaluation. When the original slides of the tumors from the original study were re-evaluated under the more stringent criteria of current analysis standards, it was determined that the lesions examined were heptocellular adenomas and carcinomas. Heptocellular adenomas are considered to be benign tumors but they can progress into carcinomas or malignancies. When indications of both liver adenomas and carcinomas are found during an examination, then the test substance is considered to have stronger ability to induce cancers. An additional two year study found that exposure to triadimefon caused dose-related increases in thyroid follicular cell adenomas and cystic hyperplasia.

When the triadimefon test data were combined with historic positive data from tests for induction of carcinomas by other closely related compounds which have indicated a tendency to induce adenomas and carcinomas, the EPA concluded that exposure to triadimefon causes heptocellular adenomas and carcinomas of the liver and thyroid follicular cell adenomas and cystic hyperplasia and that exposure to triadimefon induces cancer.

Iprodione or Chipco 26019

Test results indicated that exposure to iprodione produced increased incidences of heptocellular carcinomas in male mice, combined heptocellular adenomas and carcinomas in both male and female mice, ovarian lutenomas in female mice, and testicular interstitial cell tumors in male mice.

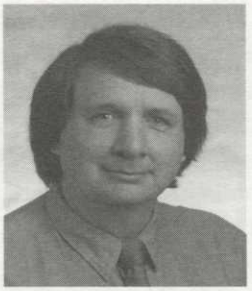
Ninety-nine week tests of mice exposed to 160, 800, 1400 ppm per body weight of iprodione found a significant increase in both benign and malignant liver cell tumors. At the higher doses male mice were found to have higher incidences of interstitial cell hyperplasia, benign tumors, and significant other changes to the structures of the testes. There was also an increase in lutenomas and tubular hyperplasia of the ovaries in female mice at the highest dose levels.

The EPA combined this test evidence with information about related compounds which have been associated with adverse effects on reproductive organs and the liver, and concluded that Chipco 26019 induces cancer.

TGT View — It is clear from this information, that turfgrass and landscape managers will have to start to ask more questions about the safety of their chemical pesticide tools. What managers do with that information will be up to them, but making an informed decision requires that all of the information about a products safety is available. The previous lack of information about the safety of these three pesticide products indicates that, in these three cases, the pesticide users, the people that buy pesticide products and keep pesticide manufacturers in business, have not been well served. Manufacturers have an obligation to the applicators of their products to keep them well informed about all aspects of their product's safety. It is the least they can do to those of us who have the greatest exposures. The source document for this article is EPA Document No. OPP-300360 "Acephate, Triadimefon, Iprodione, and Imazalil; Revocation of Food Additive Regulations" —CS ■

The "Brave New World" has arrived

by Christopher Sann



Recently, there have been two minor developments at the federal government level that will be significant to the future of turfgrass management: one at the regulatory level and the other at the legislative level. I think these two "blips on the radar" demonstrate the direction that the regulatory environment concerning the pesticide application industry will be taking in the future.

They may be insignificant but they are sure signs of change that is clearly in progress. It is a change that will affect the way turfgrass managers operate.

Legislative developments

Almost certainly in response to the Clinton administration's initiative to promote the use of integrated pest management (IPM) and to reduce pesticide usage in agriculture, a bill, HR5270, entitled the "Farm Viability and Pest Management Improvement Act of 1994" was introduced in the House.

This legislation strongly promotes IPM as the best pest management strategy for agriculture and would in all cases categorize "pesticide use" as the option of last resort.

The bill provides for the formation of regional pesticide reduction councils whose goals would be to develop plans that would lead to a measurable reduction in the use of all pesticides. States whose regional councils plans failed to meet EPA approval or who were unable to demonstrate reductions in pesticide usage, could have their authorizations to use pesticides reduced or eliminated. To fund itself, a .667% fee on the dollar value of all pesticide would be imposed.

Regulatory developments

In the recent settlement of the "Delany clause" lawsuit, the EPA has agreed to the cancellation of the use-registrations of 25 pesticides. (*Ed. note: see News Brief on page 11.*)

Fifteen of these pesticides are used in both the turfgrass and landscape industries. The EPA also agreed to look at 49 other pesticides to see if their current agricultural uses fall afoul of the no-carcinogenisity provisions of the "Delany clause".

Even though this settlement only applies to the agricultural uses of these pesticides, history has shown that once a pesticide has lost economically significant agricultural uses because of toxicity or carcinogenisity reasons, or has been identified as a problem material, that product rapidly disappears for use in turf and ornamentals.

To understand what effect this settlement will have in the long run, three pesticides, previously unidentified as being cancer-causing, Orthene, Chipco 26019, and Bayleton have been targeted in this settlement. These three pesticides are considered by many in the turfgrass industry to be mainstay fungicides and are used extensively in the management of turfgrass diseases such as Dreschlera leaf spot, Dollar spot, Brown patch, and Summer patch.

As these three pesticides become identified by the general population as being "problem" materials, it will become increasingly difficult for turfgrass managers, particularly on golf courses, to use them. Once that scenario takes place, these materials will rapidly disappear from the marketplace.

These steps are sure steps

Although these are only two small developments (as structured HR5270 will probably not pass and the targeted pesticides will probably be available for use in turf for several years to come), they illustrate the steps that are being taken in government to implement the provisions of the "reduced pesticide initiative." Short of a regulatory about-face the implementation of these new regulations will take place.

Can this initiative be derailed?

Various pesticide user groups, like turfgrass and landscape management, will gnash their teeth, wail and moan, occasionally "shoot the messenger", and may even get the implementation of certain provisions temporarily delayed, but they cannot stem the tide.

There won't be a fire storm of controversy in the agriculture industry which will burn these new regulations, because the agriculture industry, the only group large enough to have the clout to stop IPM implementa-

-continued on page 10

A business decision

Buying, leasing, or renting equipment

by Christopher Sann

Many turfgrass and landscape managers can become "equipment happy".

Most small business persons have a great deal of pride in the business that they have conceived of, started, and succeeded at. One way to illustrate their success to the world is to own equipment. Unfortunately, this desire to show success often results in the inappropriate acquisition of equipment.

Inappropriate, not in the sense that equipment that has been acquired is the wrong equipment for the job, rather that owning the equipment for the sake of ownership has become an end unto itself. Then, the ownership can become a business problem that makes it difficult to run the company.

A helpful way to avoid this problem is for managers or owners to take a serious look at leasing or renting, rather than buying equipment. Going through the process of making an informed, business leasing, renting, or buying decision can help managers in several ways. First, the decision has a better chance of being based on sound business grounds. Secondly, the decision-making process takes ego out of the equation. And, finally, there is a better chance of saving money.

Make formal buying decisions

The first step in making any buying, renting or leasing decision is an obvious one: determine if you need a certain piece of equipment. Once a need for a piece of equipment has been confirmed, the next step is to decide how often you would use that piece of equipment per week, month, season or year and for how many years it would be needed. How often you need a piece of equipment and for how long you need it are the determining factors as to whether you rent, lease or buy that equipment.

Rent, buy or lease?

Once you have determined what equipment you need and how often you will use it, then you must compare that information against standards used to identify the means of acquiring the equipment. Although the way the equipment is used is the final factor that you must use to determine the best method of acquisition, some general rules can be applied.

Renting

If you use the equipment infrequently, and its use is based on jobs that you might develop in the future and not on present contracts, then you are better off renting the equipment. By renting you avoid maintenance and repair costs, the expense of finding out if that particular piece of equipment is appropriate to the job, and all the other costs of ownership. When you rent, the cost for the rental is a fixed cost and it is easy to include that cost in any bid or cost estimate.

The one exception to this rental rule is for smaller, less expensive equipment. If you estimate that the total rental cost during a given year will exceed half of the purchase price of that equipment or that the total purchase price is less than $250, and you may have use for the same equipment in the future, then purchase the equipment. Deducting the entire cost of such equipment may be appropriate. Consult your accountant to be sure.

Buying

If you have a periodic, but unpredictable need for the use of a piece of equipment over a period of longer than three to four years or the use of that equipment requires access to it in less than 48 to 72 hours, then buying may be the right thing to do. If you will not have a need for improved versions of the equipment at a later date, or the equipment's immediate availability is required by contractual agreement, then buying may also be right.

As an example, consider snow removal equipment. The need for snow removal equipment in the northern regions is consistent, but in the transition zone the need is only occasional. If you need snow removal equipment in the transition zone it should be bought. With snow removal equipment having immediate access is the most important factor, so renting is inappropriate and over the long term leasing may cause cash flow problems.

Leasing

Leasing, which is basically a long-term rental arrangement, should be considered in any situation that does not meet the above two standards. Leasing has obvious and not so obvious advantages.

The most obvious advantage of leasing equipment is under consistently predictable production situations,

-continued on page 11

Brave New World *continued from page 8*

tion, has already surrendered.

Agriculture knows these new rules are coming and it, using evidence from earlier battles by other pesticide user groups, has decided that it won't mount a full scale attack on the new regulations but it will fight their imposition at the edges. Agriculture has decided that it wants to have some input in the process, so that the final regulations are not conceived by bureaucrats alone.

Will the Republican majority slow things?

If you think that the new Republican majority of the Congress will halt the imposition of many of the new pesticide use-regulations, I remind you of actions of the Reagan and Bush administrations.

Bush and Reagan, good Republicans both, and a bit like the current crop of anti-government zealots, professed a hatred for environmental legislation and regulation. But many new environmental laws were passed and many new pesticide regulations were enacted during their terms in office.

Despite all their bluster, politicians from both the left and the right understand that to challenge or obstruct environmental legislation designed to protect the American people is, like reducing Social Security benefits, the political equivalent of touching the third rail.

What should we do?

When I go through my repertoire of appropriate old sayings designed to reduce the pain of the inevitable, one in particular comes to mind, the Anonymous Prayer. It goes like this, "God grant me the serenity to accept the things that I cannot change, the courage to change those things I can, and the wisdom to know the difference." ■

Buying, Leasing, or Renting *continued from page 9*

particularly where upgrading the equipment every three to four years may be an important way of keeping that production at maximum efficiency. High-use production situations have a tendency to "use up" equipment, even when that equipment is very well maintained. By leasing high-use equipment for three to four years, managers have the use of that equipment under peak circumstances with little down time. Depending on the terms of the lease, once the lease period is over, the equipment can either be returned or purchased at a previously arranged nominal fee.

Leasing is particularly attractive if you are acquiring a newly designed or untested piece of equipment. It is also attractive if you need it for a limited period — say two to three years — or when such equipment has been shown to have a limited effective life span. Leasing for limited periods is particularly effective when the equipment is still in the development phase.

One of the benefits of leasing has to do with returning the equipment after the lease period has ended. Once the equipment has been returned, it can be replaced with a newer version of the same model. Surrendering short-term leased equipment allows turfgrass and landscape managers to take advantage of newer versions of the same models or change to a different equipment model that is better engineered. This ability to change or upgrade optimizes business efficiency by keeping operators from being saddled with outmoded or overworked equipment.

Does leasing cost more than buying?

Historically, leasing has been approached as strictly an accounting decision and the financial aspects of a leasing agreement are very important, but the decision whether to lease, buy or rent equipment should be, first and foremost, a business decision. ■

EPA consolidates label change policies

In order to reduce the confusion caused by different implementation dates on mandated changes in product labeling, the Environmental Protection Agency (EPA) has formed the EPA Labeling Unit.

This unit will be responsible to coordinate all labeling changes and will implement them on October 1 of each year. Currently, the deadlines for publishing revised labels often depends on the wording of the new regulation. By requiring a single date each year for the imposition of label changes to a product, the EPA hopes to reduce any confusion caused by the regulatory process. Additionally, the EPA will require that the labeled changes would go into effect on the next October 1 following the imposition of mandated changes.

TGT View - With coming widespread changes in the availability and use of many pesticide products and formulations, all applicators will now be able to better plan for the future. If on Oct. 2 of each year, the current product label says that an application of a given product can be used for a given purpose, then the applicator can have confidence that he can use that material for at least the next year. —CS

Delany settlement lists pesticide phase-out

Following the settlement of a lawsuit between the EPA and the NRDC, AFL-CIO, and other groups over the strict enforcement of the provisions of the Delany Clause, which bans carcinogenic pesticide residues in the food supply, the EPA has released a list of 46 uses of 25 pesticides that will be phased out to meet the requirements of the settlement. Even though no turf uses of any of the pesticides were banned, 15 of the 25 listed pesticides are commonly used in either turf or horticultural areas.

Based on a conversation with an individual involved in ag-extension work in the mid-Adltantic area, these pesticides have been banned because they have been shown to be at least minimally carcinogenic and the residues from their use can be detected in either raw or processed foods.

Listed below is the chemical name of each of the 15 pesticides, its common name, and the banned uses.

Pesticide	Common name	Banned usage
acephate	Orthene	soybeans
benomyl	Benlate	apples, grapes, tomatoes, soybeans
captan	Orthocide	grapes, tomatoes
chlorothalonil	Daconil 2787	potatoes, soybeans
dichlovos	Vapoma	soybeans
dicofol	Kelthane	apples, grapes, tomatoes
dimethoate	Cygon	apples
iprodione	Chico 26019	grapes
lindane	Lintox	tomatoes
mancozeb	Dithane 45	barley, oats, potatoes, rye, wheat, apples, grapes
maneb	Fore	apples, grapes
PCNB	Terrachlor	potatoes, tomatoes
thiophanate methyl	Fungo 50	apples
triademefon	Bayleton	apples, barley, grapes, wheat
trifluralin	treflan	potatoes

TGT's View - As part of the settlement, the EPA agreed to review an additional 49 pesticides, that are alleged to be cancer-causing, within the next five years. This coming review combined with the above list may ultimately lead to the elimination of many tried and true pesticide tools from both the turfgrass and the lasdacape manager's tool box. Turf and landscape managers should start to look for replacement products for the above listed fifteen pesticides as their long term survival in the marketplace is now in doubt. Even if the canceling of the agricultural uses for these pesticides does not cripple the manufacturing of these products, turf and landscape managers may not want to be using any materials that have been identified as cancer-causing. — CS

E.P.A. to cancel registrations of 1480 pesticides

The Environmental Protection Agency (E.P.A.) has said it will cancel the "registration for use" of 1480 pesticide formulations for failure of the products' formulators to pay the annual registration maintenance fees for 1994.

The deadline for acceptance of the fees was April 15, 1994. Most of these cancellations were for pesticide formulations that were no longer in production and the E.P.A. estimates that their cancellation will have very little effect on the agricultural, horticultural, or turfgrass markets. In addition to the announced cancellations, at the request of their producers, the registration fees for 42 minor use pesticides were waived by the E.P.A., which also deferred cancellation of 11 other pesticide formulation registrations for 90 days while interested parties other than the current registered producers support the products' re-registration. Likewise, the E.P.A. delayed cancellation of five active ingredients which will disappear from the marketplace unless outside parties are found to support these five active ingredients' re-registration.

Stocks of the canceled products could be distributed at the wholesale level until Jan. 15, 1995 and the products can be sold and used until supplies run out.

1994 Subject Index

Editor's Note: As a service to our readers, Turf Grass Trends *is completing the cumulative subject index for 1994.*

C (continued)

1994 Subject Index

D

1994 Subject Index

E

1994 Subject Index

F

1994 Subject Index

G

1994 Subject Index

H

1994 Subject Index

I

J

1994 Subject Index

1994 Subject Index

N

1994 Subject Index

O

1994 Subject Index

1994 Subject Index

1994 Subject Index

Q

R

1994 Subject Index

1994 Subject Index

S

1994 Subject Index

T

1994 Subject Index

1994 Subject Index

U

V

1994 Subject Index

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