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Micronutrients In Pot Culture

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"A little neglect may breed mischief; for want of a nail the shoe is lost, for want of a shoe the horse is lost, for want of a horse the rider is lost." This quote from Poor Richard's Almanac best sums up the role micronutrients play in plant production. Micronutrients are to plants as vitamins and minerals are to animals. One may survive without them but growth is less than optimum. Some of the functions of these minor elements are:

MANGANESE: Acts as a catalyst to promote and regulate certain functions, activates enzymes that control plant metabolism and functions with iron in the formation of chlorophyll.

IRON: Essential in chlorophyll formation, involved in oxidation-reduction processes and is a vital part of the oxygen carrying system. May also play an important role in nucleic acid metabolism.

ZINC: Vital in oxidation processes and for the transformation of carbohydrates. Regulates sugar consumption and is a key in various enzyme systems that regulate metabolic activity. Also needed for the formation of auxins which promote plant growth.

COPPER: Activates enzymes, some of which function in respiration. Important in protein utilization and indirectly effects cholorphyll production.

BORON: Important in plant growth associated with cellular activity that promotes maturity, flower set, fruit yield and quantity. Some foliage plants are quite sensitive to boron and toxicity can occur where levels are excessive.

MOLYBDENUM: Required for the assimilation of nitrogen in plants. Plant requirement is very low.

The activity of micronutrients in plant growth has been identified to some degree but much remains to be known. We know plants respond to applications of minor elements and are essential for growing quality plants. Compared to nitrogen, phosphorous and potassium, micronutrients are required in relatively small amounts.

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LAMAR SAPP

5500 S.W. 3rd STREET PLANTATION, FL 33317 Plant requirements vary for each element and in excessive amounts they can cause plant injury or even death. The sensitivity of certain plants to some elements, particularly boron, is known. Where ever these are a problem the fertilizer programs must be adjusted to insure these elements are eliminated or restricted.

Micronutrients come from many sources. The ability of the plant to absorb these elements depend on the source, soil environment and plant metabolism. Micronutrient sources include oxides, sulfates and chelates. Oxides are generally unavailable because of lower water solubility. Sulfates are more water soluble and tend to be preferred over oxides, however, the cost is greater. Chelate refers to a process by which metal elements are combined with chemicals, either natural or synthetic, to create a more available form of the metal.

Chelates are more expensive and their effectiveness greatly varies depending on the chelating agent used. However, they are the most available source.

The soil environment effects nutrient availability in many ways. The best Ph range for growing most plants and providing optimum conditions for nutrient availability is 6 to 7. Excessive calcium and soil colloids can combine with metals to create unavailable forms. Chelates are most desirable under these conditions. Soils must be tested to determine Ph level and adjusted accordingly.

Plant metabolism is important as it effects nutrient absorption. An active plant will absorb more nutrients. Cold weather will slow plant metabolism and nutrient uptake will be diminished.

Soil applications and foliar sprays are both effective ways of applying micronutrients. Even though micronutrients are not used in large amounts, their availability may mean the difference between average and optimum plant growth. Make sure your fertilizer program does not neglect the "nail" (micronutrients).

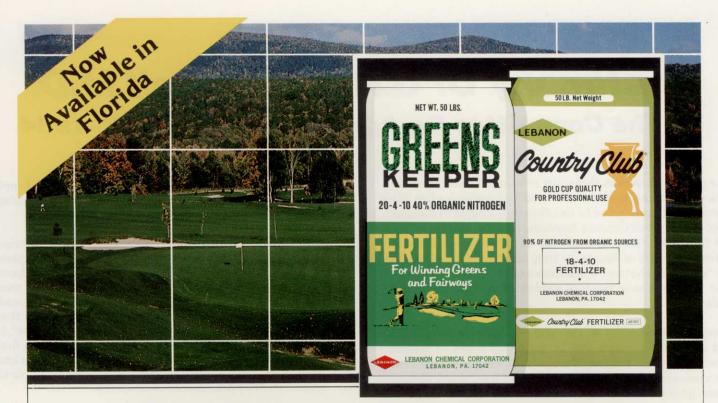
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been blessed with in recent decades, traces of man-made chemicals will certainly find a way into our food — from pest control, packaging, protection in storage and other sources. Given today's highly sophisticated analytical techniques, these miniscule amounts can be detected, even at the parts per million level.

The only sensible course is to follow the recommendations of authorities and eat a varied diet with less fat than is now commonly consumed and include plenty of fruits, vegetables and fiber-rich cereal products. I would also put some faith in our laws and our regulators. On the whole, I think they have served us well. Remember never have people lived as long and amid such abudance as the technically advanced world of 1984.

(Keith C. Barrons — Taught crop production at Michigan State University, worked for Burpee Seed Co. and Dow Chemical Co. — NEWSWEEK, April 9, 1984.)■

> -CHEMICALLY SPEAKING April 1984



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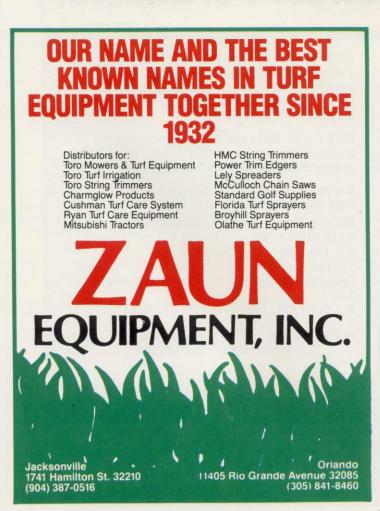
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Testimony Of G.R. Greenwell M.D. To The Committee On Agriculture On Feb. 7, 1984

The present conflicts that exist relating to EDB are examples of what can happen when our legislative bodies have allowed bureaucracies to develop into a form of dictatorship. Your predecessors apparently have either decided not to accept the responsibility of carrying out the mandates of our Bill of Rights, or they have been convinced by the "experts" that our legislators are too stupid to ever be able to have these matters explained so that they could understand.

Many bureaucracies in the U.S. have been established and allowed to evolve into dictatorship types of government agencies. Proper checks and balances have not been incorporated in the statutes which establish some of these governmental agencies. Therefore they begin to function as a dictatorship in that they;

1. Enact regulations without being required to justify their actions prior to enforcing the regulations (for example one of our bureaucracies recently pro-



claimed that water with more EDB than .1 ppb increases the risk of the consumers developing cancer to a dangerous level).

2. Immediately were allowed to embark on enforcing this regulation (law) without being required to explain why this magic number is valid. They have not been required to develop these regulations "in the sunshine" or have them evaluated by our legislators and, or, consultants appointed by our legislators so that we can be more sure that such a regulation, or "law", is just and is in accordance with our Bill of Rights in that it is needed to assist us in our persuit of freedeom and happiness. No factual data has been made available to any of us that any emergency exists.

How many "swine flu epidemic" type of so called catastrophies must you allow to take place before you feel you should require these bureaucracies to follow democratic processes and the mandates of the Bill of Rights? They have been permitted to assume that their responsibility only requires them to be concerned with some of us possibly harming others. If this assumption is valid they should be developing regulations that would prevent you from operating an automobile because you could possibly harm other people. Their interpretation of their responsibilities have been allowed to govern their conduct without them establishing the validity of this interpretation. (similar to the conduct of a dictator)

In June 1981 the Florida legislature inacted a law that demonstrates their disapproval of the F.D.A. operation since they felt that the F.D.A. was unnecessarily preventing products from being made available to the people of Florida as rapidly as they should. This statute (500.16?) established a Florida F.D.A. type of government agency, but that law like most other laws establishing these types of agencies, failed to incorporate anything which would prevent the Florida Agency from becoming similar to the F.D.A. These laws establishing government bureaucracies usually fail to require these bureaucrats to be adequately accountable for their actions. Therefore they become dictatorships that can become capable of causing a great deal of hardship without providing significant benefits to the people.

Apparently the Florida Department of Health & Rehabilitavive Services and EPA etc., have been allowed to assume that their responsibility is to prevent suffering, illnesses and injuries etc., without due concern for protecting our rights under the Bill of Rights and Constitution. Particularly our right to freedom and pursuit of happiness. They should not be allowed to interfere with our freedom unless they can prove we are causing hardship or interferring with others in their pursuit of freedom





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Mixing Gator turf-type perennial ryegrass and Sabre *Poa trivialis* provides a superintendent with a handsome, thick, dark green turf with excellent putting and mowing qualities.

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Gator was developed by hybridizing dark green, heat tolerant U.S. varieties such as Derby and Regal with denser and lower growing European turf-type ryegrasses.

Gator soared into prominence after a shining performance in a year-long trial at Mississippi State in 1981 and has since proved its qualities on many prestigious courses.

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and happiness. For example, these agencies have not been required to produce factual or scientific information which would verify that there is a widespread emergency situation related to the January 1983 recommended uses and application of EDB, nor have they been required to place this evidence (if it exists) before a scientific or legislative body for validating their conclusions before causing a great deal of expense and mental anguish to many people.

No evidence has been published that verifies that EDB exposure (as much as 40 yrs.) has contributed to the development of cancer in any human. The extent of risk to humans is based on unscientific assumptions which are inconsistent with demonstrated facts.

Our state agencies have proclaimed (without producing valid evidence) that EDB in drinking water at concentrations greater than 0.1 ppb significantly increases the risk of developing cancer due to its lifetime cummulative effect. If a person consumes 2 liters (approx. 2 qts.) of water per day containing that concentration of EDB he will consume 51.1 mgm in 70 years. This would be 0.852 mgm/kg. body weight during the lifetime. The National Institute of Occupational Safety and Health stated that no lifetime dose of EDB less than 686 mgm/kg has ever been shown to produce adverse effects in experimental animals. The Florida H.R.S. Department is claiming that the maximum safe lifetime consumption for a human (who has not been shown to be more susceptible to developing



cancer from such exposure than the mice and rats used in the studies producing cancer) is .12% of the dose that fails to produce cancer or any other adverse effect. Black pepper has been shown to produce cancer in mice at a dose equal to the amount the average person consumes in 20 years. If the EPA assumption is correct over 30% of the people in U.S. should have cancer in 20 years time of average pepper consumption.

If you allowed the maximum acceptable concentration of EDB in drinking water to be 100 parts per billion the person who drinks 2 liters per day (which is considered accaptable intake) would require over 563 years to consume an amount of EDB "below which no adverse effect were produced in experimental animals".

I have tried to obtain reports of the information which the State Department of Health & Rehabilitative Services said was supposed to verify that this regulation is immediately needed. Dr. Stephen King, who determined this magic number and assessed the danger, has been unavailable on the occasions I have tried to contact him, therefore, I was referred to Dr. Atkeson, his assistant. Dr. Atkeson told me that the information upon which Dr. King bases his decision was contained in the EDB Position Document 4 of the U.S. E.P.A. (he also told me that he would send me a copy of this information right away). approximately 2 weeks later, on November 31, 1983, I met Dr. Atkeson at a public meeting in Brandon and I had a copy of Position Document 4 and he asked me where I acquired my copy since he had been unable to obtain one prior to then. (Did they get the basis for the decision to start mass hysteria and begin spending thousands of dollars from a document they haven't seen?)

That EDB Position Document 4 developed by the U.S. E.P.A. and published September 27, 1983, which was purported to contain information validating the Florida standards was developed by following very unscientific and questionable procedures. The E.P.A. announced certain suppositions. After the rebuttals were received the E.P.A. rejected the information in many of the rebuttals and arrived at their conclusions without further outside scrutiny. This is like me setting up a debate with Rep. Martin and after each of us presents our arguments Rep. Martin decides who won the debate, without him being required to justify his decision to an impartial observer. Therefore the scientific validity of the conclusions reached in the document has not been verified. You should enact legislation that requires a review of these agency decisions and opinion of a qualified (group or individual) impartial observer.

No method of determining the potential risk of cancer development being brought about by animals or humans through exposure has been verified to be reliable by the scientific cummunity. The formula presented in Document 4 is based more on assumptions than demonstrated facts. No reports of studies (on animals or humans) have been reported that verify we can predict cancer development rates by exposing a group of animals to a specific dose of carcinogen for a lifetime or a specific period of time.

Evidence that the assumptions used by the E.P.A. for developing their conclusions in these matters are invalid

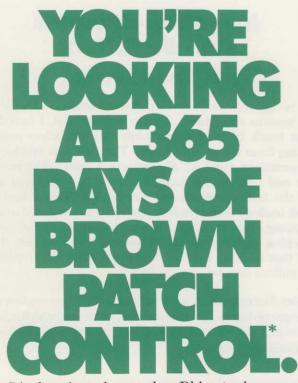
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is far greater than the amount of data indicating possible validity. For example cancer has been produced in mice by exposing them to a mushroom extract (derived from the most common commercial mushroom) at a dose of 1.34 mgm/kg. A one oz. serving of mushrooms would provide a dose of 1.84 mgm/kg to a 170 lb. man. This is 137% of the cancer producing dose in mice. Many humans consume more of this "cancer producing" mushroom than 1.34 mgm/kg on many occasions, yet no human cancer has been related to consumption of this common variety of mushrooms. A derivative of this carcinogen has been shown to produce cancer in 30% of mice which were administered a single dose of 400 mgm/kg. (The animals that developed cancer due to EDB received more than 686 mgm/kg). Therefore if we permit ourselves to apply the same risk calculation formula used by the EPA for calculating the cancer risk involved with a man eating one ounce of mushrooms more than 30% of those involved would develop cancer. If you believe that indicates their formula or risk assessment is correct I would like to meet with you after this hearing and sell you a bridge.

The Board of Toxicology and Environmental Health Hazards Assembly of Life Sciences National Research Council in 1980, estimated that trihalomethanes in water and EDB in water estimates of risks are extremely crude. The results of the studies presented did not establish that these agents cause cancer, but an exposure to them may be statistically related. They concluded at that time (based on these "extremely crude" formulas) 10 parts per million of EDB water may increase the cancer risk by 2 chances out of 100,000 during a 70 year life. The American Cancer Society estimates that 25 out of 1000 people will develop cancer without EDB exposure.

In conclusion, I suggest that you should not allow the bureaucrats to enforce a regulation of the use of EDB more strict than January 1983, until after they have demonstrated that their evidence of danger will be considered valid by disinterested scientific observers designated by you. The maximum limit of EDB in drinking water I would recommend in the interim would be the same as recommended by the expert interviewed Friday, January 27, 1983, on educational television show "McNeil-Leher Report", Mr. Havender, which was 100 parts per billion, the same level I suggested November 21, 1983. Also, someone or some qualified group should be charged with the responsiblity of developing a cancer risk formula and verifying the validity, at least in animal studies, before applying it to humans and threatening severe hardships and economic impact without first of all verifying to you and, or the scientific community that an emergency exists.

Most importantly this controversy should cause you to realize the need for legislation that will require the various government agencies to justify their actions before they are allowed to cause us to incur significant hardships and or expenses (interfere with our rights of the pursuit of happiness and freedom). The democratic system should extend down from the highest to the lowest level of government. Don't allow anyone to convince you that these matters are too complicated for anyone to provide you with an understandable explanation, so they can develop a type of dictatorship which is accountable to nobody.



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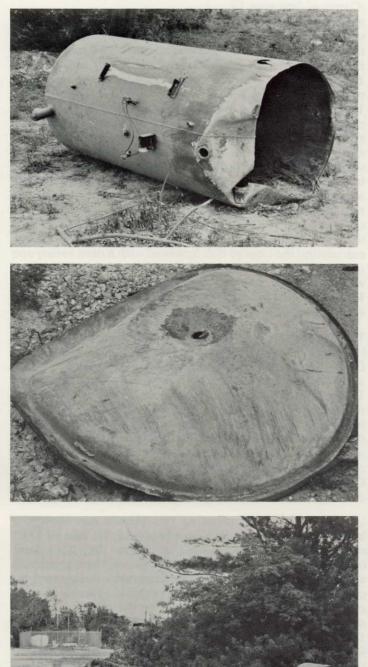
Irrigation Systems Can Be Killers

By BRAD G. KOCHER

One recent morning I arrived at work and found my irrigation system shut down. To my amazement, I found the surge track (that is 6 feet high and 30 inches around) missing from the pump station. The gate was still locked. Did someone steal it? My irrigation man came running over and told me the irrigation tank was 300 feet away with the bottom blown out. During the night it had ruptured, took off like a rocket, cleared a 6 foot fence around the pump station, sailed 300 plus feet through the air and hit a pine tree 15 feet off the ground. We can only thank God that it didn't happen during the day with employees and golfers around.

Editors Note: If you have had bizzare happenings on your golf course, send information and pictures to us for publication in future issues of the Florida Green. We can write the story for you.







Something New For Pythium

LYNN GRIFFITH A & L Labs

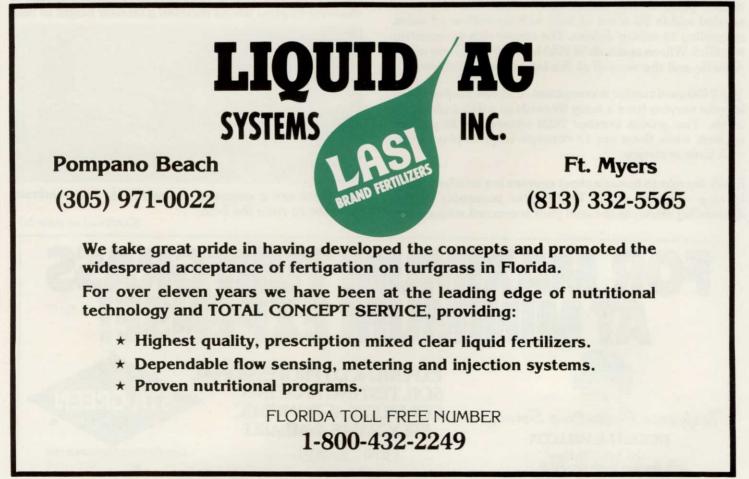
The turf industry in Florida can always use a new fungicide, especially a systemic one. Aliette is a new turf fungicide from Rhone-Poulenc chemical, makers of Ronstar and Chipco 26019. The material has been available in Europe and South America, and should be labeled for turf this year. Aliette is currently labeled for some ornamental plants, and can be purchased from some of the local suppliers.

The chemical name of Aliette is Phosethyl-aluminum. It controls Pythium and Phytophthora systemically, like Subdue or Ridomil. These water-mold fungi are among the worst diseases of turfgrasses. They are severe root rot pathogens, especially in wet weather and poorly aerated soils.

The main interest in Aliette stems from the fact that it translocates downward. When applied as a foliar spray, it is absorbed by the leaves and travels downward to the roots. Once there, Aliette works within the plant's own chemistry to combat root rot. One of the problems with many Pythium fungicides is that they must penetrate the soil quickly and thoroughly in order to be effective. In some soils, fungicide penetration can be big problem, especially with tight, compacted, poorly aerated soils. (Such soils are also ideal for Pythium.) The concept of foliar spraying to control root disease is a whole new aspect in turf disease prevention.

Research with Aliette on turf was begun last fall at the University of Florida, but the Christmas freeze cancelled any potential results. Dr. Ed Freeman is conducting tests right now with Aliette on bermudagrass, using 2, 4, and 6 ounces per thousand square feet. Aliette should be useful for disease control in most of the major commercial turfgrass varieties. The material is also being tested for aerial blight of ryegrass.

Aliette should be quite effective in controlling Pythium on commercial turf, especially in poorly drained or waterlogged soil. After excessive rainfall, it can be sprayed on without significantly adding to the excess moisture. The product is reasonably safe, but it is volatile so keep the bag closed. Aliette is also competitively priced, and is actually cheaper to use than some existing fungicides. The product should be a very useful disease control tool for the Florida turfgrass industry.





By MICHAEL J. BAILEY Boca Greens Country Club

Par 3, Executive Municipals: A Vital Link To Success Of Golf

Ultraexclusive, meticuluosly maintained and the Golf capital of the world. These are common adjectives for golf courses throughout Palm Beach County. However let us continue one phrase further - "the garden spot of the world". There are several communities nestled throughout the world, boasting of established wealth and class, yet there is no place quite as majestic as beautiful Palm Beach. All too often we associate the exclusive country club as the standard to judge all by, but for this issue of the Florida Green, the topic is of a totally different type of operation that we often overlook - the Par 3. Executive and Municipal courses. They are a vital link to the continuing success of introducing golf to the non-members country club golfer, who wishes to pursue the game. Within this realm, we will explore this topic as shown by the cover photo revealing the 7th hole at the Palm Beach Par 3 Golf Club. The course is found deep in the heart of the most choice piece of real estate in America. The course is nestled within 35 acres of land with an estimated value exceeding 35 million dollars. The course was designed by Mr. Dick Wilson and built in 1960 between the shore of the Atlantic and the seawall of the Intracoastal Waterway.

The 2450 yard course is composed of 18 Par 3 holes with lengths varying from a testy 99 yards to a demanding 221 yards. The greens average 2400 square feet in putting surface, while there are 13 strategic traps to play havoc with your accuracy.

If you are one to assume short courses are relatively easy to play — guess again! This course possesses all the demanding elements to rattle your scorecard, whereupon a sub-par round is a rarity. The geographic location of four golf holes paralleling the ocean just 200 feet from the pounding surf, not to mention the consistantly strong offshore winds, four lakes which come into play on seven holes, respective elevations within the sand dunes, the ever-present Intracoastal Waterway just waiting to swallow your shots on three holes, and the overall beauty of Palm Beach, (whew!). One tends to find the game of golf here to be extremely demanding, yet exceedingly enjoyable and relaxing.

Let us profile the typical par 3 golfer, as they are an interesting breed within our golf culture. Usually, their playing ability is somewhat limited, either by playing skills, physical capabilities, finances or perhaps even their desire to persue the game seriously and instead just play golf for a relaxing form of exercise and enjoyment. A smaller, shorter course is commonly desired because of the ease to play, not to mention a shorter length of time



"Walkers are a common site at Par 3, note minimum of clubs to ease the load."

(Continued on page 21)

