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Sump Pumps Drain Problem Wet Areas

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At the Picatinny Arsenal Golf Course, Dover, N.J., a severe drainage problem existed on two holes and desperately needed correction. A high water table existed. Also, surface runoff water collected on two fairways and would not percolate thru the organic soil. In fact, the area became so wet it was impossible to carry out fairway mowing on many occasions. Greens Chairman Frank Ferry, Superintendent Michael George and Engineer John Klusick went to work on a solution.

On the 13th Fairway, a hole was dug for a 50-gallon drum. Holes were made in the side of the drum and crushed stone placed around the outside of it.

Direct burial cable was snaked through existing drain pipe from a 110-volt electric meter covered duplex outlet. An electric sump pump was installed in the drum casing with the 2-inch discharge plastic pipe connected to the existing 6-inch drain pipe which emptied into a brook. (See Figure 1)

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Figure 1. Electric sump pump discharges excess water from low area into brook.

Compatibility of Chemicals

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Often in the past, mixing of turfgrass chemicals has been dismissed because its value in time saving was not considered as important as the risks involved.

This should not happen without considering all the advantages. Tank mixing chemicals to achieve broad spectrum control or, in some cases, synergistic action is one of the real opportunities for the golf course or other turfgrass superintendent to test his know-how.

Since very few chemical firms will stipulate which competitive chemicals are compatible with their products, the superintendent and applied-research person must learn by experience and experimentation what products can be tank mixed.

There are a few rules and guidelines that a superintendent can follow which will make him sufficiently knowledgeable to tank mix his chemicals without the fear of encountering phytotoxicity.

CHEMISTRY GUIDELINES

The chemical nature of the pesticides is important but not necessarily the determining factor. Some of the general warnings on chemistry applicable to mixtures are:

- Do not mix alkaline and acidic materials. Violent reactions occur when concentrated forms of these types are mixed, but the reaction can be insignificant if they are mixed in diluted form in the spray tank.
- Great chance of failure or problems exist when mixing chemicals that are strongly acid or alkaline, such as ammonium sulfate, ferrous sulfate, nitrate, sulfur, lime and chlordane.
- Soluble fertilizers may have a salting-out effect on herbicides.
- Do not mix wettable powder pesticides with emulsifiable formulations or a soluble fertilizer. A very good rule to follow is never premix the concentrated chemicals. Add them singly to the tank at high dilutions.

Chemically, all pesticides can be divided into three classes: nonionics (no charges), cationics (positive charges), anionics (negative charges). It is a basic simple fact that all positive charges attract all negative charges, and that if a compound has no charges it has no attractions. The only affinities that the nonions have are their abilities to mingle with solvents of similar nature and not mingle with solvents of dissimilar nature.

Water is the superintendent's primary solvent. With respect to water, nonions are further subclassified into hydrophyllic (water loving) and hydrophobic (water hating). The former are water soluble, and the latter are water insoluble.

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Comments and Opinions

WHY THE RECENT CAMPAIGNS AGAINST SOME TURFGRASS PESTICIDES?

Recent articles on dangers of pesticides have frightened the public and some users. Cancer is the major bogeyman. This dreadful disease deserves a fearful reputation, but useful pesticides like any other facet of our way of existence should not be "junked" without worthwhile reasons.

For those who are concerned about pesticides and cancer some of the following which has been summarized from the Council for Agricultural Science and Technology commentaries should be of interest.

Death from cancer has increased some in the United States. Yet this increase must be tempered somewhat by the fact that age distribution has shifted toward older people who have always had a higher incidence of cancer.

Part of the increase results from more people dying from lung cancer. You already know of the association of smoking and lung cancer.

Cancer mortality shows a high rate in urban-industrial areas. (Read on, please.) The World Health Organization estimates that 85 to 90 percent of the human cancers in industrialized countries are of unknown origin. The nature of the bulk of cancer cases has not changed with industrialization. The cancer that killed our grandparents before industrialization still remains the major threat.

Stomach cancer rates have decreased significantly while cancers in other sites have increased. The incidence of liver cancer death decreased from 8.8 to 5.6 per 100,000 for 1930 and 1972, respectively. During this period the organochlorine insecticides were introduced. The number of older people in the population increased during this period which is a factor for a higher incidence.

Many chemicals have been or are being banned because they become suspect with vast dosages on test animals. In many of these cases, the creature would require hundreds of years to ingest the test dosages from the environment.

While the vast and abrupt dosages may cause tumors in the test animal, it is unsound biological thinking to conclude that it happens in humans. Also, tumors are not cancers.

We must respect chemicals in our environment, but action taken against a useful chemical should not be based on extrapolation. In most cases, more information on the chemicals' effect on humans should be gathered.

What is the basis for the impending loss of chlordane when studies have shown that humans, exposed to much larger quantities of chlordane in manufacturing plants than the rest of the population, have shown no evidence of more cancer or chlordane associated medical problems?

Or what is the logic to the proposed banning of amine type herbicides, which are not used in large quantity, because of fear of nitrosamines that develop commonly from more natural sources?

– R.E.E.

PREVENTIVE MEDICINE

From the *Wall Street Journal* comes this interesting exchange between biller and bill payer:

At the request of a state heart association, an eastern utility included with its bill a leaflet entitled, "How to Tell You're Having a Heart Attack." A physician attached the following note with his bill for $158.76: "The juxtaposition of the booklet and your monthly bill is admirable. I would, however, suggest if some way could be devised to have the customer read the booklet before the bill, many more lives could be saved."

Our New 'Flag'

Surely by now you will have noticed another improvement in your *Green World* – the redesigned "flag" at the top of the front page. Call it a heading if you want to, but in the publishing business it's a "flag." We hope you like it. Or even salute it.

ARE YOU SATISFIED WITH YOUR IRRIGATION?

The 1976 season has been a good turf year where watering was not a problem. If you were unable to water the grass as you would have liked, now is the time to make some changes or install a system.

The dry year helped inspire this suggestion but more than this, my attendance at the New Jersey Irrigation Association's field day impressed me with all the specialized equipment that has become available to help put water where it is needed.

There seems to be a head or control for about every occasion. Thus, by using this equipment or doing such things as relocating heads or improving the capacity of the system, you will have a better chance of watering the grass precisely as needed in dry periods which occur every year.

– R.E.E.

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(Chemicals, from Page 1)

When cations and anions get together they form salts. As a rule, big, heavy salts are not water soluble, but smaller ones are. Thus, the salt index comes into play, and is of vital concern to the superintendent, as well as the cation exchange index of the soil.

RULES AS SAFEGUARDS

All of this technical information is becoming familiar to more and more superintendents. Yet, I would have been remiss by omitting it. But now that it has been reviewed, the superintendent will be delighted to learn that pursuing this knowledge, although basic, is not a road block to prediction of chemical compatibility in use. While the chemistry is important and ominous, the physical nature of the pesticides is a good starting guide in contemplating mixtures.

If mixing of chemicals causes a chemical reaction, fouling of the tank mix is likely to occur. I can cite a hypothetical case. If insecticide preparations are supplied as oil-soluble concentrates, to which have been added emulsifiers in the sulfonate and phosphate classes to render them emulsifiable in water, they could be precipitated by cations in the tank. This would destroy the emulsion, resulting in oily layers of insecticide in the tank. Of course, this could cause disaster, but it should not happen with a trial tank mix. To guard against such an occurrence, we formulate our first rule:

RULE 1 – Never tank mix emulsifiable insecticide concentrates.

While insecticides may not be incompatible in the mixture, they usually require watering in to get adequate control and to avoid phytotoxicity. This procedure can be incompatible with other chemicals that might be included.

I am not an insecticide chemist and do not wish to make recommendations. Consequently, I have taken a cautious approach to the allowable parameters of tank mixing insecticides with other chemicals. A number of superintendents do tank mix them for a light surface treatment for control of surface-feeding insects as compared with grub-proofing treatments.

Use of fertilizers, fungicides, and herbicides is more familiar to me, and there are extremely helpful guidelines one can follow to overcome many compatibility problems. These three classes of chemicals fall into two simple categories, solubles and insolubles.

CHEMICAL COMPATIBILITY TABLE

SOLUBLES	INSOLUBLES	SOLUBLE-INSOLUBLE COMBINATIONS
	FUNGICIDES	
PMAS Caddy Cadminate Actidione	Tersan-75 Tersan-LSR Tersan-SP Spotrete Bromosan Spectro 3336 1991 Fore Maneb Zineb Captan Daconil 2787 Dyrene Fungo	Calochlor Kromad Actidione-RZ Actidione-Thiram Thimer Cadtrete
	INSECTICIDES	
Dursban EC Diazinon EC Chlordane EC Sevin EC Malathion EC Proxol SP Dylox SP	Diazinon WP Dursban WP Sevin WP Malathion WP	
HERBICIDES 2,4-D DSMA 2,4,5-T MSMA MCPP AMA Dicamba	*HERBICIDES (Pre-emerge)* Dacthal Tupersan Balan Betasan	
	FERTILIZERS	
Urea Ammonium Phosphate Ammonium Sulfate Potassium Nitrate Muriate of Potash	Ureaform IBDU	

Three more rules can be formulated which the superintendent must observe.

RULE 2 – Mixing the insolubles (largest category). Most insolubles can be tank mixed without incurring phytotoxicity provided the products are sprayed at recommended rates of each of the individual products.

This permits the tank mixing of a great variety of chemicals. Most important of all, it allows the superintendent to spray three, four, or more chemicals at the same time. Exploring the possibilities should disclose many advantages. Take disease control for example. The superintendent who sensed that his greens were succumbing to a disease which he could not identify properly could put Daconil, Dyrene, Thiram, 3336, 1991, Captan, Maneb, etc., in a single spray. Of course, this is a ridiculous and preposterous example of the latitude, but to the superintendent who lost his greens and his job for want of the proper fungicide, this knowledge would be welcome.

The point here is that *broad spectrum disease control is a must on the greens. Only on occasional treatments can the superintendent rely on a single chemical to control a single target disease.* Growers, pathologists at various agricultural colleges, manufacturers and I are attempting to obtain better control by mixing chemicals.

More recently, with the advent of systemic fungicides, the broad spectrum mixture has assumed brighter and newer horizons by combining the

longer residual control attainable with the addition of a systemic along with the action of contact fungicides.

Prior to the systemics, it was an accepted fact that contact fungicides did their job on the grass plant and were dissipated within two to three days. While the contact fungicide is sprayed on the grass blade at about 1000 p.p.m., it doesn't take more than two to three days for the fungicide to be diluted below the effective level of 5 p.p.m. with present-day irrigation and mowing.

This is not the case with systemics. Sufficient hydrolysis and activity takes place in the soil to knock down the fungus population not only in the soil but also within the grass blade by diffusion through the plant. This increases the time of protection during extended periods of rain or long weekends.

When mixing soluble chemicals (including fungicides) apply Rule 3:

RULE 3 – Mix only one soluble chemical with any number of insolubles. If two soluble chemicals are tank mixed with or without insolubles the rate of each soluble should be cut in half to avoid phytotoxicity.

The soluble fungicides are not numerous: PMAS, Caloclor, Cadminate, Caddy, and Actidione, and superintendents are familiar with them and have had experience in their application. Coincidentally, three large manufacturers have packaged mixtures of solubles with insolubles.

Since fungicides differ in the stage of attack, and the fungus and fungicides differ in longevity, I have maintained that the ideal tank mix of fungicides is a three-way combination of soluble contact-insoluble contact-insoluble systemic mixture. And for years, I have even recommended mixing two soluble contacts each at half rate to get a broader spectrum than the single soluble at full rate.

All of the insolubles can be tank mixed by applying Rules 2 and 3 in an attempt to get a broader spectrum of control. They can also be tank mixed with one of the solubles or one of the soluble-insoluble combinations. If the solubles and the soluble-insoluble combinations are tank mixed, the dosage should be cut in proportion to the number of chemicals added.

It should be emphasized again that the dosages of two solubles should be cut in half if tank mixed. If three solubles are tank mixed, the dosages should be cut to one-third the recommended rate of each soluble component.

Superintendents know that fertilizers are usually combinations of organic (insoluble) and inorganic (soluble) components, and because of the soluble fractions the fertilizers must be watered in to prevent burning. It is not an uncommon practice to add soluble fertilizers to the spray tank in small quantities to attain an immediate greening effect on specific occasions. A more common practice is to add chelated iron for the same reason. But there have been many instances of burning because the superintendent has had a heavy hand in applying these products.

The phenomenon known as salt index comes into play in determining how much of the soluble fertilizer components can be added to the spray tank without incurring phytotoxicity. The author has formulated another simple rule which acts as a guideline to proper use without incurring the risk of burning the desirable grass:

RULE 4 – Soluble fertilizers and trace elements can be added individually or mixed provided that amount will not exceed one ounce per gallon tank spray mix.

This represents a dilution of 1:128.I have used 2 ounces per gallon, and have not experienced any burning at the higher rate, but prefer the lower rate. The components that fall into this category are solubles such as urea, ammonium nitrate, ammonium sulfate, and muriate of potash, ammonium phosphate, ferrous sulfate, chelated iron, epsom salts, etc.

Herbicides also are both soluble and insoluble. The soluble herbicides are postemergent in nature whereas the insolubles are primarily pre-emergent in activity. The problem of phytotoxicity is an important factor when dealing with soluble post-emergent herbicides. As a general rule, the phytotoxicity index (safety factor) is narrow for all postemergent chemicals. Yet, they have been used rather extensively and effectively, by following the rates of application closely.

The tank mixing of two or three soluble postemergent herbicides is becoming more and more prevalent. This practice is useful because the superintendent has found a synergistic effect with combinations; but in doing so he must again apply Rule 2 which states that whenever solubles are added to the spray tank the dosage rate should be cut proportionately, depending upon the number of solubles. A prime example is the successful combination of MCPP,2,4-D and Dicamba. While the recommended rate of MCPP is 1 to 1½ lbs., the rate of 2,4-D is 1 lb. and the rate of Dicamba is a one-quarter to one-third lb. per acre, a successful combination of the three is commonly one-half lb. MCPP, plus one-quarter lb. 2,4-D, plus one-eighth lb. Dicamba. The superintendent can mix these or purchase them in approximately that ratio.

There are some MCPP plus 2,4-D combinations that call for the respective rates of 1 lb. and one-half lb. per acre. Some growers mix one-half lb. 2,4-D and one-fourth lb. Dicamba per acre. Another example of the synergistic effect of two postemergent chemicals is the combination of DSMA and 2,4-D.

In Texas where 2,4-D is not used prevalently because of its injury to cotton, DSMA is recommended for the control of dallisgrass at the rate of 12 to 16 lbs. per acre on bermudagrass while in the neighboring state of Louisiana equally good control has been achieved by the use of 6 lbs. DSMA plus one-half lb. of 2,4-D.

This practice has been going on for over 10 years and, coincidentally, it conforms with Rule 3 which dictates that if two solubles are used together it is a wise practice to cut the dosage of each in half.

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(Sump, from Page 1)

The water table is maintained approximately 2 feet below the fairway from January thru December. The fairway became firm, providing mowing with the 7-gang equipment and gave a playable fairway.

A green plastic packing material was secured to the lid of the 50-gallon drum with adhesive to provide a normal bounce should a golf shot land here. The estimated cost of the project is less than $500.

On the 14th Fairway, a similar hole was dug for another 50-gallon perforated drum. Crushed stone was again placed around the outside of the drum casing. The area was regraded to the sump hole.

Electricity was not readily available.

A 4-inch irrigation line with a 1½-inch plastic drain pipe was extended from the water pump to an existing drain pipe adjacent to the fairway and piped to the brook.

The system is used during the golfing season, during rainy weather or if irrigation water runoff enters the sump hole.

The float is lifted by the water pressure activating the irrigation water through the ejection valve providing suction to the drain pipe. As the surface water in the sump is lowered, the float descends to the normal position shutting off the irrigation water and the water level is maintained approximately 2 feet below the grass area.

This installation also cost less than $500. (See Figure 2).

While the golf course superintendents and the greens committee were pleased with the success, the membership was most happy because of the improved appearance and playability of these fairway areas.

Figure 2. Hydraulic cellar drainer has float to regulate sump's water level in wet area.

(Chemicals, from Page 4)

Finally, there are two classes of chemicals which are infrequently used by turfgrass superintendents, and by their very nature cannot or should not be tank mixed. They are nematocides, such as Dasanit and Nemagon, and general weed and grass killers such as Phytar, Paraquat, and Roundup.

One parting word of caution regarding tank mixing. When the superintendent embarks on the use of a new formula, he would be wise to do two things: Observe small volumes of tank mix for any signs of physical or chemical change, and repeat several trials on small areas where a bad result causes no problem. Note the results to determine what benefits the added chemical offers.

Tank mixing is challenging and very rewarding when the superintendent masters it.

Green Bug Aphid Attacks Ohio Lawns

Many lawns in Ohio are being attacked by a new lawn pest. The insect has been identified as *Schizaphis graminum* (Rondani) or the green bug aphid. This is not the same aphid that attacks trees and shrubs.

Aphid damage on lawns in Ohio was reported as early as 1973, but cases were infrequent. In 1975 aphid damage was relatively common and there were numerous reports in 1976, especially in the Columbus and Dayton areas.

The green bug aphid will feed both in shaded areas and in direct sunlight. This aphid feeds on the grass blade by injecting a toxic substance into the plant and sucking out plant fluids. Populations of 20 or more per grass blade are not uncommon. Damage first appears as an under-fertilized or under-watered area turning to a distinctive brownish-orange cast. If left unchecked, large areas can turn totally brown and die.

At present there are no labeled insecticides for aphids on turf. Materials labeled for aphids on trees such as Diazinon and Malathion will control them.

— Ohio Turfgrass Foundation Newsletter

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SUSTAINING MEMBERS

The NJTA again expresses thanks for the continued support of its sustaining members. Any omission in the following list is unintentional and should be brought to the attention of the editor:

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