Nutrient Runoff from Nurseries — Is it a Problem?

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Is nutrient runoff from nurseries a problem? If it is a problem, whose problem is it? How should we be involved in this issue? All of these are questions which growers are now asking. In this brief review of nutrient runoff, I hope to clear up some information and misinformation, and enable growers to make educated decisions for our future

PUBLIC PERCEPTION AND THE PROBLEM

One thing to keep in mind no matter what the issue is that to the public facts mean little—perception means everything. What an individual believes to be true has a stronger impact than that which can be proved by fact. An example of this comes from a recent meeting at our Department of Environmental Protection and Energy, by ostensibly scientific people. During that meeting to talk about the use of composted waste products a statement was made to justify elimination of the use of composted waste products on farmland. Several "facts" were mentioned. It was indicated that corn land was the obvious location to use these products — probably false since other crops can also benefit. Corn was also implicated as a heavy user of pesticides — false The statement was then made that since pesticides get into the groundwater, nutrients would also move into the groundwater. Studies of wells in agricultural areas of New Jersey have indicated no pesticide penetration into the groundwater. Nutrients, specifically nitrogen, do move into the groundwater. Based on these "facts" the individual proposed that none of these composted waste products be applied to farmland, or other land in New Jersey.

A second item to remember is that emotion makes law. Facts and reality only initiate an emotional response which results in laws and regulations The classic example for our area has to do with the gypsy moth program, where the pesticide carbaryl (Sevin: LD50 (female rat) = 246 mg/kg; male = 283 mg/kg) received enough bad press that it was removed from the spectrum of recommended pesticides for the state spray program Allegations were later proven to be false A replacement pesticide, trichlorfon (Dylox· LD5O (rat) = 250 mg/kg) has toxicity levels equal to carbaryl, but does not have the name recognition, and is therefore acceptable

A final note involves the mass media — newspapers, radio, and TV. These are the primary sources of information to the public. In its' present format, the news is highly editorialized by somewhat liberal personalities. News today must quickly catch the attention of those reading, listening, or watching, or it does not sell. This can lead to sensationalism, and less than accurate reporting. Catch words are used frequently, and result in incorrect interpretations. In our business we have words such as pesticides, which indicates poison (not pest control). Meanwhile disinfectant (which is used in the home and is a pesticide) means clean. Other dichotomies include nutrient runoff which equates to pollution, while fertilizer at the home equals green or beauty.

WHAT AND WHY ARE WE TRYING TO PROTECT?

Aside from the public perception issue then, why should we even consider runoff as something we should address? Our future and the cost thereof is one of the situations we should look into. We have two natural sources of potable water in this country. Surface water has problems with phosphorus. Specifically, aquatic growth is limited by the phosphorus content of the water. Eutrophication of a surface body of water will begin at a 2 ppm concentration level of phosphorus. The quality of the water source will decline once eutrophication proceeds.

Groundwater is the other natural source of potable water. The Environmental Protection Agency has set the legal limit of nitrate-nitrogen (NO_3-N) in potable water at 10 ppm. While there have been few cases of methemoglobonemia (blue baby syndrome), justification for this standard is not just motherhood and apple pie. The only possible discussion may be on the margin of safety, which is great.

Let's look at the history of methemoglobonemia. It can be stated in the United States, there has never been a recorded case in adults. The most recent infant fatality occurred in 1989. It was the first in 25 years, and in that case, the infant was fed formula which was prepared with water containing 70 to 80 ppm NO_3-N. There are sub-lethal problems which may affect individuals also. It should be noted that the information is from large animal studies. Included in the list of potential problems are. vitamin A deficiency (pink eye in cattle), thyroid disorders (iodine deficiency), reproductive problems, oxygen deficiency (methemoglobonemia), and general undiagnosed maladies. It was also noted however, that animals tend to build a tolerance to the nitrates when given low level doses

Standards, no matter how good or bad they are perceived by us can always be acceptable, as long as they are uniformly administered. In New Jersey, there was a proposal to reduce the standard for potable water from 10 to 3 ppm NO_3-N This would make us unable to compete because of regulation.

THE LAW

What is happening nationally with regard to water regulation? By 1988, eight states already had groundwater legislation on the books. They included Arizona, California, Illinois, Iowa, Mississippi, Missouri, Nebraska, and Wisconsin. Debate on pending legislation was scheduled during 1989 in Georgia, Hawaii, Kansas, Louisiana, Massachusetts, Minnesota, Montana, New York, Ohio, Oregon, South Dakota, Tennessee, and West Virginia.

Can we survive with our heads in the sand? It is my belief that we must be pro-active rather than reactive. We must conduct the research necessary and institute changes in our production schemes which will reduce potential problem areas. We, as producers of nursery stock, should always keep our image in mind. We must know how we want to be viewed by those around us. I believe we are protectors of the environment. We produce shrubs, trees, flowers, and above all, beauty. If public relations is objectionable, look at it as public education. We must get the message out of the good we are doing for our environment.

SOURCES OF AQUIFER AND SURFACE WATER CONTAMINATION

The question of where nitrate contamination of groundwater and phosphorus contamination of surface water come from is always an issue for agricultural producers. "Non-point source pollution" is a term which has come from the federal

government. Farming can fall into this category when runoff from production areas leaves the property. Whether we like it or not, agriculture does contribute to both groundwater and surface water contamination with nitrates and phosphorus respectively.

Now the other half of the story. We are not the only ones causing problems Organic disposal systems can produce contamination. Old landfills, or those without a liner will leach any type of compound—from nitrates to toxic compounds. Septic systems are designed to satisfy clean water standard by dilution. The design is to result in a dilution which does not exceed the federal standard of 10 ppm. Obviously, this type system is designed to contaminate only to a certain level. Industrial disposal has also provided contamination. Even processors of food products can add to the nitrate load, when field applying waste water

INFORMATION FROM THREE YEARS OF CONTAINER RUNOFF MONITORING

Over the last three years, a total of seven states have been involved in monitoring runoff water from container nurseries. This was a cooperative projects in the Eastern part of the United States. The results are being compiled, but I can give you some basic information and trends which I saw in New Jersey. First, I must give you some information about the experimental design.

Water was monitored during peak runoff (in the late mid-period of the irrigation cycle) for nitrate-nitrogen and phosphorus Samples were not to be taken immediately after fertilization nor immediately after rain Samples were taken from nurseries which used only liquid fertilization, those which used only slow release fertilization, and those which used a combination of those two fertilizers.

The results were consistently inconsistent. High and low levels came from nurseries using each type of fertilization. Part of the answer may lie in the fact that samples were not taken close to the times of fertilization for liquid fertilization nurseries. It was typical for all nurseries that the concentration of nutrients peaked at the production site for nitrates, and declined as one proceeded toward the impoundment. For phosphorus, the trend was to peak at the impoundment, and decline toward the production site. Impoundment water peaked at about 20 ppm nitrates late in the season, while the phosphorus peaked at about 1.7 ppm Early in the season, nitrates were, in several cases, actually lower in the impoundment than from the wells. Conversion, volatilization, and sedimentation are all apparently involved Ammonia will volatilize, while nitrates will experience denitrification. Phosphorus is not lost, and can probably be found in the sediment portion of an impoundment.

WHAT CAN WE DO AS PRODUCERS?

No matter what the solutions, they must be cost-effective and commercially feasible. Look at fertilizer efficiency. There are many ways to manage efficiency A change to slow release fertilization from liquid is the most obvious. Maximizing space utilization is another way of making better use of the fertilizer applied. Timing fertilization can also help Some information on episodic growth of certain types of plant material was conducted in California. Theoretically, plants exhibiting this type of growth could be fertilized only when the plants will actually use the nutrients Changes in container design to more effectively use water should be

realistic under proper management also.

Use of an impoundment to maintain runoff water on-site is a technique used by an increasingly large percentage of growers in our area Additional modifications could result in filter strips being incorporated into the system. Work has indicated that filter strips will clean water that passes through it There is some discussion as to the proper design size, and there are also questions as to the method of "cleaning" the water. Much of the "cleaning" may come from precipitation of the particulate matter in the water. Some may also come from uptake of the nutrients in the water.

The use of a wetland filter has been used effectively. It should be noted that wetlands are ecosystems. We are not speaking of just poorly drained soils. Wetlands tie-up nitrates by denitrification. One of the earliest marshes used to "clean" water is at Brookhaven, here on Long Island. While it may seem that this type cleaning system may require more space than an impoundment, an accelerated cleansing time will lead to a probable reduction in potential size differentials.