



GCSAA AFFILIATE

# Turf Times

Monthly Update  
August 1995  
Vol. 24, No. 8

The newsletter from the Northern Michigan Turf Managers Association

## Meeting & Golf Aug. 14 at Grayling Country Club

Our August meeting will be held on Monday the 14th at the Grayling Country Club. Bryon Conklin is our host superintendent.

Golf will begin with a 10:00 a.m. shotgun start. Golf will be followed by lunch.

Cost for the day, including golf and lunch is

\$30.00 payable to Grayling Country Club.

The Grayling Country Club is located just south of town on business loop I-75 in Grayling.

Call (517) 348-5618 for reservations on or before August 11.

## Mechanics Meeting Aug. 16 at Matheson Greens G.C.

The topics for this meeting are: Diesel Troubleshooting; Hydraulic Hoses and Fittings.

The meeting will begin at 8:30 a.m. and last until noon.

Lunch is free. Golf is \$10.00 for 9 holes and

\$15.00 for 18 holes.

Matheson Greens is located near Northport on county road 633. Call for reservations and directions (616) 386-5600.

Hosts for the meeting are: Pat Mertz, Golf Course Superintendent; and Bill Hughes, mechanic.

### Classifieds

#### WANTED:

**EDITOR FOR NMTMA PUBLICATIONS:** Responsibilities include Editing and mailing newsletters and membership directory, including advertising sales. Contact Mike Morris (616) 352-4241 or Mark Wildeman at (517) 732-6711.

## 1995 MTF Field Day

The 1995 Michigan Turfgrass Field Day will be held Thursday, August 17, 1995, at the Hancock Turfgrass Research Center, Michigan State University, East Lansing, MI.

For further information contact Kay at 517/321-1660.

CLIP AND SAVE

### 1995 Meeting Schedule

September 18 ..... The Natural, Gaylord  
NMTMA Fundraiser

October 10 ..... The Legend, Bellaire  
Chapter Championship

### 1996 Meeting Schedule

February 21 & 22 ..... NMTMA/GCSAA  
Seminars: ..... Human Resource Management &  
Drainage Systems-Gaylord

### Mechanics Meeting

September 13 ..... Mechanics Mtg.  
Shanty Creek

## - NOTICE -

### NEXT MEETING:

NMTMA Fundraiser  
September 18  
at The Natural in Gaylord

Watch *Turf Times* for details

# NMC to offer Plant Science Degree Programs

Beginning in August 1995, Michigan State University (MSU) and Northwestern Michigan College (NMC), together in Traverse City, will offer a new "close to home and work" certificate and degree program. All required coursework for an **MSU Certificate in Landscape/Nursery, Turfgrass Management, or Fruit Production** and for an **NMC Associate of Applied Science in Plant Science degree** will be available on a parttime or full-time schedule, with many classes offered late afternoons and evenings (please see the program summary for details and a course schedule).

## Program Options and Course Requirements

Course Title	Semester Credit Hours
Industry Seminar (Fall 95)	MSU 1
English Composition I	NMC 4
Basic Soil Science (Fall 95)	MSU 3
Intro to Chemistry (+ Lab)	NMC 4
Practical Botany & Horticulture	NMC 4
Basic Economics	NMC 3
Intro to Computers in Business	NMC 3
Intro to Turfgrass Management (Spr. 96)	MSU 3
Landscape Maintenance (Spr. 96)	MSU 2
Fertilizer/Pesticide Application (Fall 96)	MSU 3
Landscape Plants I (Fall 96)	MSU 3
Landscape Planning & Design (Spr. 97)	MSU 3
Agronomics of Lawn Care (Spr. 97)	MSU 3
Internship (May-Aug.: Sum. 97)	MSU 3
Plant Pest Problems & Management Alternatives (Fall 97)	MSU 4
Landscape Plants II (Fall 97)	MSU 3
Irrigation of Nursery & Landscape Systems (Spr. 98)	MSU 2
NMC Independent Study	NMC 2
NMC Experience/Orientation	NMC .5
<i>Certificate Semester Hours: Total</i>	<i>53.5</i>
English Composition II (1)	NMC 4
American Government (1)	NMC 3
Humanities (elective) (1)	NMC 4
(1) Associates of Applied Science (AAS) required courses	
<i>AAS Degree Semester Hours: Total</i>	<i>64.5</i>

## Program Option and Course Requirement Notes:

- NMC courses are offered every semester at various times and days. Check the Academic Schedule of Classes, published each semester, for details.
- Fruit Production Certificate students will have some specialty course substitutions.
- MSU-NMC AAS Plant Science degree students wishing to transfer to MSU's College of Agriculture and Natural Resources's Bachelors of Science degree program (in East Lansing) may complete an approved course package with one additional 3 credit NMC social science course and one additional 4 credit NMC humanities course.

## 1995-96 Tuition:

**NMC Grand Traverse County Residents/In-District**  
(not including registration, general or lab fees)  
\$ 49.25 (per semester hour)

**NMC In-State (other Michigan counties)/Out of District**  
(not including registration, general and program fees)

\$ 81.50 per semester hour

**MSU Michigan Residents**

(including registration, technology and program fees)

\$ 373.75 1 semester hour

\$ 506.50 2 semester hours

\$ 639.25 3 semester hours

\$ 772.00 4 semester hours

\$ 948.25 5 semesters hours

\$ 1,083.00 6 semester hours

\$ 1,215.75 7 semester hours

\$ 203.50 Lifelong Education per semester hour  
(non-degree/non-certificate: credit or non-credit option available)

## Other Program Benefits:

- **Specialized applied plant science training and preparation** from an internationally recognized University program and outstanding "close to home" community college
- Certificate options in landscape/nursery, or turfgrass management (lawn care/athletic field management), or fruit production
- Earn either the **Associates of Applied Science** or a **Certificate**, or **Both**
- **All required NMC degree and MSU certificate**

(Continued on Page 7)

## Mechanical Soil Technology

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# Tank Mixing Fungicides for Better Control

Written by: Paul Sartoretto, Ph.D.

Technical Director, W.A. Clearly Chemical Corporation

My article, "Compatibility in the spray Tank," was first published in February of 1977. In that article I described four simple rules which, when followed, would permit one to successfully tank mix pesticides without incurring phytotoxicity. This present article deals with one specific aspect of tank mixing - namely, fungicides - to obtain a broader spectrum of disease control for the turfgrass professional.

## A Question of Solubility

As the world of fungicide products shrinks due to slower new product introductions and faster old product retirements, I get an increasing number of phone calls asking about the compatibility of pesticides in the spray tank. I welcome the calls, but if one were to truly understand a universal principle of tank mixing and its relationship to phytotoxicity, one could pigeon-hole any new product by knowing if it is soluble or insoluble. The manufacturer will use key letters after the name of the product that can indicate whether it is soluble or insoluble. Examples of such letters are as follows:

### Solubles

- S: Solution
- SP: Soluble Powder
- E: Emulsion
- EC: Emulsifiable Concentrate

### Insolubles

- WP: Wettable Powder
- F: Flowable
- WDG: Water Dispersible Granule

For quick and easy reference, I have categorized in table form the commonly know pesticides currently used for turf disease control. Should a new pesticide appear on the market, just determine whether it is soluble, then proceed using the following information. A large number of pesticides are insoluble, and before they can be used they must be milled down to submicron size so that they will disperse in water, whereas solubles dissolve in water, and when in solution, are molecular in size. Submicron size particles are thousands of times larger than molecules. Therein lies the difference. A solution when sprayed on a grass blade will move in and out of the bade at ease by the process of osmosis. In other words, molecules of water and molecules of soluble pesticide will easily move in and out of the grass blade through the stomates. Too high a concentration of soluble pesticide or soluble beneficial fertilizer will burn the grass. The insoluble submicron particles of pesticide or organic fertilizer are too large to pass through the stomates. If they can't enter the grass blade they won't burn the grass. Understanding this universal principle, one can conclude insolubles are not phytotoxic when tank mixed together up to the labeled rates for each product. However, solubles could be phytotoxic at or below labeled rates in the tank mix. Label rates of soluble pesticides must be respected and carefully followed. If you were to mix full rates of soluble pesticides, you would undoubtedly exceed the safety factor and encounter phytotoxicity. That is why it is necessary to back off and use half rates, or even third of the rates, when mixing soluble pesticides. A classic example is a premixed herbicide product when contains a combination of three soluble herbicides: 2,4-D,

MCP, and Dicamba. These products generally contain 1/3 pound of 2,4-D, 1/2 pound MCP, and 1/9 pound of Dicamba per acre, which are actually 1/3 rates of each if you were to use them separately. Many other examples of this concept exist both in pesticides and fertilizers. Also discussed in my previous articles is the treatment of Emulsifiable concentrates. Some manufacturers will take water insoluble pesticides and dissolve them in hydrocarbons, then add emulsifiers. Most ECs (emulsifiable concentrates) are insecticides. Treat them like solubles, all because the hydrocarbons can penetrate the grass blade through the stomates. Since the pesticide is now soluble in the hydrocarbon, it is no longer submicron size, but is molecular in size, and can also penetrate the grass blade.

## Tank Mixing

Tank mixing fungicides is not new, and there must have been someone advocating tank mixing before me, but I started with the classic tank mix of PMAS - thiram forty-five years ago. That popular tank mix was used for almost 35 years. PMAS was a powerful, soluble contact fungicide with both preventive and curative properties, but its solubility was its shortcoming. It was sprayed at 500 ppm. and within two or three days, the normal irrigation practices would wash it off the grass blades, whereas Thiram was an insoluble contact sprayed at 10,000 ppm. and it took at least four or five days to wash off the last traces of it. Had PMAS been sprayed twice a week, there would have been no need to add Thiram to it because the grass blade would have been protected at all times. Therefore, insolubles were added so that the superintendent would only have to spray once every seven-to-ten-day intervals.

To appreciate the value and importance of insoluble contact fungicides, one has to understand how they work. First, understand that they are truly not insoluble, but for all practical purposes, they are referred to as insolubles with solubilities in water in the range of 10 to 100 parts per million (p.p.m.), low enough to be regarded as non-phytotoxic when sprayed at heavy rates. Their action is preventive, not curative. They act very similar to pre-emergent crabgrass killers as opposed to post-emergent crabgrass killers. One puts down a heavy rate of pre-emerge crabgrass control which has only a few parts per million solubility, sufficient to kill the tender crabgrass seedlings which have germinated. But if crabgrass has rooted and slightly matured, that few parts per million solubility is insufficient to kill the plant. Insoluble contact fungicides act in a similar manner. They are applied at heavy rates, and as long as there are a few parts per million of insoluble fungicide left on the grass blade, it is sufficient to kill the spore when it sends out its tender shoot, but the insoluble contact doesn't have sufficient solubility to kill the more mature mycelia. That's the job of the soluble contact.

It was this philosophy that set a trend in the fifties, and other manufacturers followed shortly thereafter. Each had excellent soluble contacts with good curative power which

(Continued on page 4)

# Tank Mixing Fungicides for Better Control

(Continued from Page 3)

never had to be used above the rate of one ounce per 1000 sq. ft., as phytotoxicity could be encountered above that rate. This group of products was efficient and economical, and was mostly used in conjunction with insoluble contacts. Mallinckrodt had Calo-clor and Cadminate and also mixtures with Thiram. Upjohn had the excellent Actidione, and sold it straight or mixed with PCNB or Thiram. Cleary also added soluble Caddy to its line. Believe it or not, DuPont also had a soluble organomercury in its line. Tersan OM was a combination of mercury and Thiram. If you were a superintendent in the fifties and sixties, I'm sure you would have been tank mixing, or using tank mixed products. The mixtures were always a soluble with an insoluble contact. However, the seventies ushered in a new era—the advent of the systemics and the phasing out of those great soluble contacts. In the 1970s, three great systemics were introduced: DuPont's 1991, Cleary's 3336, and Rhone-Poulenc's 26019. They were awesome when first used commercially. One or two ounces per 1000 sq. ft. gave excellent broad spectrum control for six or seven weeks! It appeared there was no further need for soluble or insoluble contacts. Then strange things began to happen. The rates had to be bumped and the intervals were shortened, and still disease was coming through. The grass plant which was supposed to be rendered immune was succumbing to resistant strains of the diseases, just as we had experienced resistance in the past with insects and insecticides. In medicine, antibiotic drugs were performing similarly. Repeated use of the same antibiotic developed resistant strains of the infectious organism. Obviously, the answer was simple, switch to different systemic or a different antibiotic which would control the dominant resistant strain. It worked, but for how long? Until another resistant strain

developed? Fortunately, several good systemics were developed during the late seventies and eighties, and the practice of alternating systemic pesticides has reduced the resistance problem somewhat, but not completely. A few years experience with the new systemics made us realize that the contact fungicides, far from becoming obsolete, had to fill in the gaps of disease control created by the deficiencies of the systemics. Therefore, it was logical to add 3336 to the near-perfect mixture of PMAS+Thiram. The residual control of PMAS+thiram was tailing off at the ten-day interval; adding 3336 did extend the control. Ultimately, in the late eighties, all soluble contacts came under scrutiny by EPA, and as a result—PMAS, CADMINE, CADDY, ACTIDIONE, and CALOCLOR. They were all powerful and economical products to use. They have been sorely missed, and have made the job of replacing them expensive and complicated. Personally, if I had to choose between systemics or soluble contacts, I would prefer the latter.

## Fungicides are Different

Although there appears to be a fairly large number of systemic fungicides, these fungicides are limited to a small number of chemical families. Competitive factors have led to the development of new materials; however, these products are the results of structural changes to the molecules within a similar chemical group. Research has shown that the fungicidal activities of these groups are similar, normally disrupting one distinct function within the fungal organism. When tank mixing, it would not be wise to mix two systemics within the same group. No synergism or broader spectrum of activity is achieved by doing so. This is so beautifully explained by Dr. Patricia Sanders, Penn State Plant Pathologist, in her article, "Use

(Continued on Page 5)

## Turf Fungicides In Use Today

Product	Formulation	Chemical Name	Solubility
Chipco 26019	50 WP/2F	iprodione	insoluble
Cleary's 3336	50WP/4.5F	thiophanate-methyl	insoluble
Aliette	80 WG	fosetyl-Al	soluble
Banner	1.1 EC	propiconazole	soluble
Banol	6 EC	probamocarb hydrochloride	soluble
Bayleton	25 WP	tridimefon	insoluble
Cleary's PCNB	75 W	pentachloronitrobenzene	insoluble
Curalan	4.17 F	vinclozolin	insoluble
Daconil 2787	4.17 F/90 WDG	chlorothalonil	insoluble
Defend	2 F	pentachloronitrobenzene	insoluble
Dithane T/O	75 W	mancozeb	insoluble
Domain	4.5 F	thiophanate-methyl	insoluble
Fore	80 WP/4F	mancozeb	insoluble
Koban	30 WP	etridiazole	insoluble
Prostar	50 WP	flutolanil	insoluble
Protect T/O	80 WP	mancozeb	insoluble
Rubigan	1.1 F	fenarimol	insoluble
Sentinal	40 WG	cyproconazole	insoluble
Spotrete	4F/75 WDG	thiram	insoluble
Subdue	2E/25 WP	metalaxyl	soluble
Terrachlor	75 WP	pentachloronitrobenzene	insoluble
Terrazole	35 WP	etridiazole	insoluble
Thalonil	90 DF/4 F	chlorothalonil	insoluble

# Tank Mixing Fungicides for Better Control

(Continued from Page 4)

Sense and Be Skeptical." This article is a classic and should be read, studied, and thoroughly understood by anyone who wishes to begin tank mixing. She explains there are three groups of broad spectrum systemic fungicides:

**BENZIMIDAZOLES:** Cleary's 3336, Fungo-50, Tersan 1991 (discontinued)

**DISCARBOXIMIDES:** Chipco 26019, Vorlan

**STEROL INHIBITORS:** Bayleton, Banner, Rubigan

Dr. Sander's research has shown that any fungus that is resistant to one member in a group will become resistant to all the members in that group. Therefore, it is futile to mix systemics within the group. "Broad spectrum systemics must be mixed between but not within groups." Example: don't mix 3336 with 1991, but you can mix 3336 with Bayleton or 26019. she also points out that there are three Pythium systemics: Subdue, Canol, and Aliette. They each have different modes of action; they can be mixed as either two-component or three-component systems, using half rates or, in the latter case, using one-third rates to avoid resistant strains. Dr. Sanders has found that reduced rates of fungicides in the mixtures are not only economical and environmentally sound, but do produce a broader spectrum of control and have been found to have a synergistic effect. I have also found the same results in all my tank mixing.

## Fungicide Mixtures

Since most systemics have been found to be somewhat deficient in the control of some diseases, it is necessary to add contact fungicides to the mixture to make up for this deficiency. A good example is brown patch. I have found by adding Daconil 2787 and Mazcozeb product such as PROTECT T/O or PCNB, or Thiram, to the systemic mixture, brown patch does not occur, but without them it will eventually persist.

In other research, Dr. Bruce Clarke at Rutgers University has done some remarkable work in controlling summer patch with 4 ounce per thousand rates of the sterol inhibitors such as Banner, Bayleton, etc., and also 8 ounce per thousand rates of benzimidazoles such as 3336, or Fungo 50 at monthly intervals. The results are phenomenal, and when combined with proper soil chemistry management, indicate that the turf manager may finally get the upper hand on this disease. Best results occur when they are watered in. They have long residuals in the soil and these heavy rates give one full month's protection before the next application. Unfortunately, some superintendents are using this application solely for disease control on greens, and could be in danger of getting resistance, or also the occurrence of other diseases such as brown patch for which systemic control is weak. I reason that it would be just as sensible to supply the grass plant with incremental amounts of systemic through weekly or ten-day interval applications, and in these incremental applications contact fungicides are added to the mixture so that they can do their job. Contact fungicides fail when they are not present on the grass blade, but succeed when they are. To spread the interval of application beyond ten days is not a good idea for contact fungicides. Also, watering in the mixture is bad because the contact must stay on the grass blade as long as possible. Your irrigating practice will suffice in getting the systemic into the soil.

It has a long residual. I have had excellent control by spraying a mixture of 1/2 ounce Bayleton, 1 ounce 3336, 1 ounce Daconil, 1 ounce Thiram at weekly or ten-day intervals, and when stressful disease weather approaches, increasing the contact fungicides to 2 ounces each, yet keeping the systemics at the low rate. Other substitutions can be made, such as substituting 26019 or Banner in the mixture, but always making sure that one is not using two systemics within the same group.

The example I gave you had two Cleary products in the four-way mixture, and that is not academically fair to the reader. You could get equally good results with a non-Cleary mixture such as 1/2 ounce Banner, 1 ounce 26019, 1 ounce Daconil, and 1 ounce PCNB, or 1 ounce Mazcozeb per 1000 sq. ft. at seven- to ten-day intervals. Remember, the short interval is important so that you can get the full benefit of the contact fungicides.

It is easy for a well-educated plant Pathologist to criticize the use of such mixtures, but pity the superintendent whose job is on the line because he has had chronic disease problems and has occasionally lost a few greens. The ecologists are insisting that he spray less, and the pathologists want him to target the fungicide to a specific disease, when actually he is not that knowledgeable in anticipating what disease might show up and what would be the likely preventive spray. Skipping sprays because there are not visible symptoms of disease is economical, but risky business. I have found this sort of practice is why most superintendents fail. They might get by for two or three years, but eventually they get hit hard and lose their jobs. Call my program for what it is—a shotgun treatment. But I look at it differently. I tell the superintendent, "You're on automatic pilot." Instead of coming in every Monday morning trying to devise a spray program for the anticipated disease based on the weather forecast, you start on this broad spectrum program in the spring and stay on it, defying any disease to break through that barrier. Believe it or not, I have many successful converts, most of whom are on it because they were in trouble, and after being put on the program have been successful.

I must stress one last time the importance of the intervals of sprays. Monthly intervals defeat the whole program. Remember that contact fungicides are only active for about four days. What good are they are in a monthly spray program? They are not too efficient even in a two-week interval. The perfect program is a weekly interval. A near perfect program is a ten-day interval. Many successful superintendents have adopted the compromise of a ten-day interval. All of the university field trials are either two-week or monthly intervals. That is too bad, because it has impacted the mind of the superintendent into thinking these are the proper intervals. Not so. The universities don't have the money or the personnel to test weekly or in ten-day intervals. But therein lies the secret of success.



# Play it Safe when Mixing Chemicals

Summer is one of the busiest times of the year. With all the pressures of the job, it is easy to overlook safety precautions when handling chemicals. The following checklist is a reminder that you can never be too busy to remember proper safety habits. Keep the list handy the next time you are handling chemical mixtures.

- ➔ Read the label carefully. Take particular notice of personal safety and environmental precautions.
- ➔ Wear appropriate personal safety equipment when handling chemicals.
- ➔ When mixing and loading chemicals in the field, ensure that you prevent spills that might contaminate water supplies.
- ➔ Prevent spray-tank overflow by never leaving the tank unattended.
- ➔ When filling sprayers, avoid back-siphoning by keeping the discharge ends of fill hoses above the tank's water level.
- ➔ Be certain pumping equipment has anti-back flow devices and check valves.
- ➔ Never exceed labeled chemical rates, mix carefully and calibrate your sprayer before applying chemicals.
- ➔ Prevent having leftover chemicals by mixing only the quantities you need.
- ➔ Never rinse equipment near well-heads, ditches, streams or other water sources. If needed, install a longer rinse-water hose to allow you to move the cleaning operation to a safe distance from the well.
- ➔ Before disposing of chemical containers, triple rinse or pressure rinse them. Then, pour the liquid into the spray tank.
- ➔ Dispose of equipment and container rinse-water by spraying it out over the soil following label instructions.

## The Right Mix

When preparing your tank mix recipe, it's wise to take a few moments to prepare a record of the following items:

- The prescribed rates for each product.
- Capacity of the spray tank.
- Amount of mix to be applied.
- Types and rates of any additives.
- Areas covered per tank.
- Types of nozzle you plan to use.
- Nozzle pressure in pounds per square inch (psi).
- Tractor speed.

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## NMC to offer Plant Science Degree Programs

(Continued from Page 2)

courses offered in Traverse City at Northwestern Michigan College

- Many courses can be completed on an "adult learner friendly" part-time or full-time schedule, with many classes offered late afternoons and evenings
- MSU certificate courses available on a convenient two-classes each semester, three-year schedule: beginning Fall 1995 and concluding Spring 1998
- A Bachelors of Science transfer program to MSU's College of Agriculture & Natural Resources (East Lansing main campus) available
- Industry professional practice seminars and workplace internships are included
- Need-based MSU + NMC student financial assistance available
- A non credit (non-degree/non-certificate) option available

For additional program and coursework details and to receive an MSU + NMC Applied Plant Science program information and admission packet, please call: **Andy Norman**, in care of MSU North (616) 929-3902, 812 South Garfield Avenue, Traverse City, MI 49686-3464.

## REMINDER:

**1995 Clean Sweep** - The MDA 1995 Clean Sweep Program implementation is underway. Program application forms have been mailed and preliminary publicity initiated. Tentative collection sites and dates are listed below:

SITE	COUNTIES	DATE
Cadillac	Manistee, Missaukee, Osceola Wexford	Aug. 26 *Aug. 28
Watervliet Traverse City +	Berrien, Cass, Van Buren Antrim, Benzie, Charlevoix Emmet, Gr. Traverse, Kalkaska, Leelanau	Aug. 26
Clarksville	Barry, Ionia, Mecosta Montcalm	Sept. 20
Hart	Lake, Mason, Muskegon Newaygo, Oceana	*Mid Sept. Aug. 22
Hudsonville + Kalamazoo	Allegan, Ottawa Branch, Calhoun, Kalamazoo, St. Joseph	*July
Mich U.P.+	Delta, Mackinac, Menominee, Schoolcraft, Iron, Dickinson	*Mid Sept.

\* Date not finalized

+ Location(s) not set - to be determined by participant response. Michigan U.P. committee plans on using milk-run format used last year.

If you are not one of the counties listed above, but you know growers who want to participate, call the Extension agent in the nearest county that is part of the '95 program. Otherwise, call Chuck Cabbage, MDA, at (517/ 373-9744, and he may be able to make arrangements.

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