MICHIGAN TURFGRASS REPORT

SUMMER

1965

VOLUME III - NUMBER I

1965 FIELD DAY SUMMARY

Michigan Agricultural Experiment Station
Michigan State University
East Lansing

MICHIGAN STATE UNIVERSITY

TURFGRASS FIELD DAY

A Review of Turfgrass Research

At Michigan State University

9:30 A.M. - 3:30 P.M.

Thursday

July 8, 1965

Sponsored by the

Departments of Crop Science and Soil Science

Michigan Agricultural Experiment Station

East Lansing

Michigan

The results of these investigations are dedicated to the production of improved lawn and sports turf for all residents of Michigan.

MORNING PROGRAM

Crop Science Field Lab, Beaumont Rd.

The turf experimental areas have been established three years. The bentgrass area was planted in the fall of 1961 and the general (1½" cut) turf area in the spring of 1962. All experimental areas are irrigated to maintain adequate soil moisture.

8:30-9:30 A.M. Registration at table east of bentgrass plot area.

9:30 A.M. Welcome and Introductions: Dr. M. B. Tesar and Dr. R. L. Cook, Chairmen of the Departments of Crop Science and Soil Science, respectively.

OPTIONAL STOP (Any time during the day)

--Located in basement on east side of wood frame barn--

Harlan Stoin

Controlled climate chamber studies on the biochemical mechanisms of high temperature growth stoppage in Merion bluegrass.

* * *

DATES TO REMEMBER

September 14, 1965 - M.S.U. Northern Michigan Turfgrass Field Day at Traverse City Country Club, Traverse City, Michigan.

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March 16 and 17, 1966 - The 36th Annual Michigan Turfgrass Conference, Kellogg Center, Michigan State University, East Lansing.

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Bentgrass Variety Evaluations

Dr. James Beard

Fourteen varieties in 10' x 16' plots maintained under putting green conditions. North 1/2 of each plot receives 4# of nitrogen per 1,000 sq. ft. per year and the south 1/2 receives 7#.

1964 BENTGRASS VARIETY PERFORMANCE

Variety	Quality Rating* (1-best, 9-poorest)	Density Count 10/6/64 (Shoots per square inch)
Congressional (C-19)	1.4	100
Cohansey (C-7)	1.5	89
Toronto (C-15)	2.1	88
Penncross**	2.5	81
Seaside**	3.5	87
Old Orchard (C-52)	3.6	72
Evansville	4.0	136
Astoria**	5.8	60
Washington (C-50)	6.2	55

* Average of monthly ratings
** Varieties established by seed

Congressional, Cohansey, and Toronto continue to rank as the best vegetative bentgrasses through the first three years. Penncross ranks as the top seeded bentgrass. Toronto does have a tendency to thatch, due to its vigorous growth habit, which could become a problem if not properly managed.

Note that the severity of yellow tuffs is greatly reduced in comparison to the initial three seasons. Evansville, Seaside, and Cohansey proved to be much more susceptable to snow mold (Typhula sp.). Congressional, Toronto, and Washington were the most resistant to snow mold.

Evansville and Iagreen show an excessive tendency to thatch. Cohansey, Toronto, and Penncross ranked best in spring green-up.

Bentgrass Strain Evaluations - Thirty-six experimental selections in 4' x 4' plots are being evaluated for potential commercial use. Holfiar, a seeded colonial bent from the Netherlands, shows promise. Others to note are MSU-28-Ap from Michigan State, NJ-55-4 from Rutgers, Exeter from Rhode Island, K(42)3 from Penn State, and Springfield from Kansas State. Note the performance of roughstalk bluegrass and creeping red fescue under ½ inch mowing.

Soil mixtures and Relative Infiltration Rates

Dr. Paul Rieke

Soil mixes prepared in the laboratory are subjected to several treatments in order to determine the most appropriate mixture for a desirable putting green mixture. This soil would possess properties of rapid infiltration and drainage, reasonable water holding capacity, resistance to compaction, and ability to hold a well-played ball. Natural soil, sand and peat have been used as basic materials. Uniformity of source of these materials as well as their mixing are extremely important in obtaining consistent results in putting greens. The composition of a desirable mixture will vary with the size range of sands used, percentage of silt and clay plus kind of clay in the natural soil, and the kind of peat. Cores of soil mixes from the laboratory show the effects of increasing sand, soil, or peat on infiltration.

Soil cores from field plots established by Dr. Tyson on the Soils experimental farm indicate the effects of coarse sand, fine sand, fine sandy loam, and peat on growth and infiltration. Field data are being obtained from these plots.

Fertilizer Application Methods

Dr. Robert Lucas

Ammonium nitrate was applied June 25 at rates of 0, 1, 2, 4 and 6 pounds of nitrogen per 1,000 square feet on established Merion and common Kentucky bluegrass plots. 6' x 7 1/3' in size. Application methods were dry, dry followed by 1½ inches of water, and spray application. The spray was applied at the rate of 1/2 gallon per plot or about 500 gallons per acre. The first evaluations were made June 28.

Percent of leaves affected (burned) by fertilizer application. Observations made 3 days after application.

N rate (1,000 sq.ft.)	Merion			Common		
	Dry	Watered	Spray	Dry	Watered	Spray
Check	0	0		0	0	
1	10	0	40	5	0	50
2	35	0	70	30	0	75
4	20	2	90	30	0	95
6	50	0	100	45	0	100

The spray applications resulted in a high percentage of burned leaves even at lower rates of application. This burning effect, in most cases, occured on the tips of the leaves with healthy crowns remaining; while the dry application without water showed crowns which were injured on some plants while other plants were unaffected.

Rates of soluble nitrogen up to 6 pounds were found to cause little or no foliar burning if properly watered following application.

Note the rate of recovery on the various plots.

It should be pointed out that this study was directed to the immediate foliar burn effects occurring right after application. The higher nitrogen rates used are known to cause other undesirable effects such as root reduction, also.

Turfgrass Mixtures

Dr. Carter Harrison

Eighteen grass mixtures in 5' x 9' plots. After three years, mixtures of bluegrass and red fescue continue to rank higher than bluegrass-red fescue mixtures containing perennial ryegrass. A small percentage of perennial ryegrass is still persisting to an objectionable degree. Mixtures containing as little as 5% redtop rank quite low in quality.

Seed Number vs. Seed Weight Conversion Table

Percent by seed number					vs.	Percent by seed weight				
KB	RF	PR	TF	R		KB	RF	PR	TF	R
75	25					57	43			
50	50					21	79			
25	75					8	92			
33	33	33				8	29	63		
60	20	20				20	25	55		
20	60	20				5	55	40		
50			50			20			80	
33	33			33		19	73			8

KB - Kentucky bluegrass
RF - Red fescue
PR - Perennial Ryegrass
TF - Tall Fescue
R - Redtop

Bluegrass Variety Evaluations

Prof. Stuart Hildebrand

Twenty varieties in 5' x 9' plots. A severe leafspot attack occurred the second week of May, 1965. Thinning is still apparent in common, Park and Delta. For the first time in four years Prato, Newport and C-1 have shown some thinning due to leafspot (Helminthosporium sp.)

1964 BLUEGRASS VARIETY PERFORMANCE

Variety	Quality Rating* (1-best; 9-poorest)	Density Counts 10/8/64 (Shoots per square inch)	Leafspot Thinning (1-least; 9-most
K 5(47)**	1.5	6.4	1.3
Merion	1.6	6.5	1.7
Prato	1.9	8.7	4.3
Newport	2.1	6.2	3.7
Park	2.6	5.5	4.7
Delta	2.7	6.0	5.0
Common	3.6	4.8	6.7

* Average of monthly ratings
** Experimental selection

The Penn State selection K 5(47) continues to rank on top through 1964. Of the commercially available varieties, Merion continues to rank highest, provided it receives a higher maintenance level. Park and Delta continue to show leafspot susceptability; but are able to recover from the thinning much more rapidly than Common.

Prato has slipped in ranking compared to previous years, due primarily to some susceptability to leafspot which first occurred in 1964.

Those showing good establishment vigor are Park, Delta, Prato and K 5(47). Common ranks best in spring green-up and late fall color.

Red Fescue Variety Evaluations - Twenty-two varieties in 5' x 9' plots. Leafspot thinning occurred in mid-June, a month earlier than any attack in the previous four years.

1964 RED FESCUE VARIETY PERFORMANCE

Variety	Quality Rating** (1-best; 9-poorest)	Density Count 9/8/64 (Shoots per sq. inch)
Golfrood*	1.3	12.1
MSU-18-Fr*	1.4	8.1
S-59*	1.4	11.5
Highlight*	1.6	8.2
Pennlawn	2.0	6.8
Rainier	2.5	6.5
Illahee	3.3	4.5
Common Chewings	3.4	6.0
Common Creeping	3.7	5.1

* Experimental selections
** Average of monthly ratings

Of the commercial varieties, Pennlawn and Rainier ranked slightly higher in 1964. For the first time in three years chewings is ranking higher than common creeping. The four experimental selections, Golfrood and Highlight from the Netherlands, MSU-18-Fr from Michigan State, and S-59 from England, all rank considerably higher than Pennlawn in turf quality and density.

Control of Turfgrass Diseases

Dr. Nicky Smith

CONTROL OF DISEASES OF TURFGRASSES

Organism/Disease	Most susceptible Grass	Control measures
Helminthosporium	Bluegrasses	1. Fertilize adequately 2. Actidione-thiram every week, 9 times from April Fools Day
Helminthosporium	Bentgrasses	Dyrene-Scope Lawn Fungicide
Powdery Mildew	Merion	Karathane
Striped Smut	Merion	No control

Stop 6 Continued

Control of Diseases of Turfgrasses(Continued)

Organism/Disease	Most susceptible Grass	Control measures
Fusarium roseum Blight	Merion	Dithane M 45-4oz./1000 sq.ft. every 7-14 days in July-August
Rhizoctonia brown patch	Bentgrasses	Dyrene-Scope Lawn Fungicide
Rust	Merion	1. Fertilize adequately with high nitrogen fertilizer 2. Actidione-thiram
Sclerotinia dollar spot	Bentgrasses Merion	Cadmium fungicide
Snow mold	Bentgrasses	Mercury fungicide such as Caloclor or Tersan OM
Pythium	(Special wet conditions)	Dexon
Fairy Ring	Any grass	Punch holes and fill with water, detergent and fertilizer
Slime mold	Any grass	Rake grass and forget it
Moss Algae	(Shaded, wet compacted areas)	1. Sunlight, fertilize regularly, aerate. Drain if too wet. Water when droughty 2. Copper sulphate. 1 oz. per 1000 sq. ft.

Follow manufacturer's recommendations, particularly where dosage and timing are not given above. Spray fungicide with at least 100 lbs. per square inch pressure and use 7 to 10 gallons of water per 1000 sq. ft.

Use this as a supplement to USDA Home and Garden Bulletin #61- Lawn Diseases - How to Control Them. Use proper precautions in the use of all chemicals.

Thatch Build-up, Management and Control

Prof. Leyton Nelson

A long term investigation of optimum management practices to minimize thatch build-up and subsequent disease problems. Factors under evaluation include cutting height (1 vs. 2"), clipping return vs. removal, mechanical thatch removal vs. none, and six nitrogen rates in all combinations of 144 treatments.

THATCH is defined as a tightly intermingled layer of living and dead stems, leaves, and roots of grass which develop between the layer of green vegetation and the soil surface. Higher rates of nitrogen fertilization, development of more vigorous grass varieties, increase in watering, and Michigan's cooler climate which favors mid-summer growth have contributed to the current prominance of the thatch problem.

Thatch accumulating to a depth of more than 1/2 inch creates the following undesirable conditions which result in deterioration of the turf.

1. Greatly enhances the micro-environment for disease activity including leafspot, strip smut, powdery mildew and Fusarium rosium.

2. Elevates the grass crowns above the soil to the extent that drought resistance is reduced.

3. A tight thatch or mat can greatly inhibit aereation and water movement into the soil. Water movement is particularly impared when the thatch is dry.

Thatch has only recently become a problem in lawns and is not widely known or recognized as yet. The lawn owner notes a disease or drought problem rather than the major role of thatch.

SAMPLING FOR THATCH - To determine the degree of thatching present cut a pie shaped wedge two inches deep, remove the plug, and make an examination of the vertical cross section. Superficial examinations from the surface are not effective in determining the amount of thatch which is present.

CAUSES - The specific causes of thatch formation are not well understood. Factors which are related to thatch formation include (a) acidic conditions, (b) return of clipping, (c) excessive nitrogen feeding rates, (d) a vigorous growing variety of grass, (e) heavy irrigation, and (f) heavy (clay) soils.

Turfgrass Insect Control

Dr. William E. Wallner
Department of Entomology

Turfgrass is subject to injury by a relatively small number of insect species. Yet severe economic losses may result by costly replacement of damaged sod. Turf insects can be classified into 2 groups based on their feeding habits; (1) root feeders and (2) leaf feeders. Generally chemical control measures for one group are not effective for the other and vice versa.

ROOT FEEDERS --	Control
white grubs (larvae of; Phyllophaga sp., Japanese Beetle, Asiatic Garden Beetle)	Dieldrin - 3 lb. actual/acre Chlordane - 10 lb. actual/acre Aldrin - 2 lb. actual/acre Heptachlor - 2 lb. actual/acre
Wireworms	Control same as above

LEAF FEEDERS --	Control (Rate/100 gals. water applied as a spray to treat 5000 sq. ft.)
webworms and cutworms	2 qts. 25% Diazinon emulsion 4 lbs. 50% Sevin Wettable Powder 2 lbs. 50% DDT Wettable Powder 2½ pts. Ethion 4E
chinch bug	2 pts. 25% Diazinon emulsion 2 lbs. 50% Sevin Wettable Powder 2 pts. Ethion 4E 3 1/3 pts. Trithion
leafhoppers	2 qts. 25% DDT emulsion 2 lbs. 50% Sevin Wettable Powder

OTHERS --	Control (Treatment/acre)
ants	Chlordane 5 lb. actual Dieldrin 2 lbs. actual
earthworms	Chlordane at double the grub proofing rates.
moles	Generally a problem where grubs and earthworm populations are high. Thallium-treated peanut bait will give good control
clover mites	Generally a household problem apparently causes very little turf damage.

Watering and Water Sources for Turf

Dr. Robert E. Lucas

Recommendations for irrigation call for as intrequent watering as is feasible. Water should be applied to wet the soil to a depth of 6 inches with each irrigation to encourage deep rooting. Very high maintenance level turf, such as putting greens, may require a light watering under very high transpiration conditions.

Water source for irrigation is important. Water from most wells in Michigan contains dissolved calcium carbonate. Over a period of years this may cause soil pH to rise above 7.0 which could induce micronutrient deficiencies particularly iron. Sodium, sulfates, chlorides, and sulfides also can be present in undesireable concentrations, especially from ponds and certain deep wells. It is best to have a prospective water source tested for its desirability for use on turf.

A. Total hardness of water x 0.23 equals pounds of limestone produced per one inch of water.
   Example 5 inches of water applied which contained 300 ppm. of hardness.
   5 inches x 300 ppm. x 0.23 factor = 345 pounds of limestone equivalent.
   On a 1000 sq. ft. area this example amounts to 7.9 pounds of limestone.

B. Limestone needed to correct acidity produced by one pound of nitrogen from:
   ammonium sulfate = 5.5 pounds
   ammonium nitrate = 1.8 "
   urea = 1.9 "

Sodding and Seeding Practices

Dr. James Beard

Plots were seeded (1#/1000 sq. ft.) and sodded with Merion on June 16 and 28, 1965. The west one-half of the seeded plots was straw-mulched (100#/1000 sq. ft.) and the east one-half was not mulched. Three irrigation treatments were used: (a) daily at noon, (b) every three days, and (c) every 6 days. Note the comparative rates of establishment. Daily watering of sodded plots was just as important as the seeded plots. The straw mulching of seeded plots was extremely beneficial. The unmulched, seeded plots which were watered daily did not result in satisfactory establishment.

Nitrogen-Potassium Fertility Studies

Tom Duff

Nitrogen rates of 0, 4, 8, 12 and 16 pounds per 1000 sq. ft. per year and potassium rates of 0, 2, 4, 6 and 8 pounds per year were applied in all combinations to Toronto bentgrass and Kentucky bluegrass. The objective of this study is to evaluate the effects of these treatments on low temperature survival, turf wear, and turf quality.

Weedy Grass Identification

Dr. Carter Harrison

Tips on key plant structures used in the identification of problem lawn weeds such as annual bluegrass, quackgrass, tall fescue, bentgrass, crabgrass, nimblewill and timothy.

Mower Investigations

Prof. Leyton Nelson

Reel and rotary mowers are being compared under four heights of cut: $\frac{1}{2}$, 1, $1\frac{1}{2}$ and 2 inches. The study was initiated in the fall of 1962. Visual differences have been observed for two years with the rotary mowed plots having a browned appearance for 3 to 4 days after each mowing. To date no differences have been found in density.

Tee Grasses - Six grasses in 5' x 9' plots are maintained at a ½ inch cut. Merion has consistently ranked highest. Pennlawn red fescue has performed better than Common Kentucky bluegrass at the ½ inch height.

Bluegrass Blends

Prof. Stuart Hildebrand

Nine blends in 5' x 9' plots. This is a long term study to determine the possible advantages of blending bluegrass varieties to reduce disease problems. The blends containing Merion have ranked highest.

1964 PERFORMANCE OF NINE BLUEGRASS BLENDS

Percent Composition					Quality Rating* (1-best, 9-poorest)	Density Count 9/14/64 (Shoots per square inch)
Merion	Common	Delta	Park	Newport		
50		50			1.3	7.4
50				50	1.3	9.1
76	6	6	6	6	1.4	8.0
50	50				1.5	7.8
33		33		33	1.6	8.9
20	20	20	20	20	1.8	8.7
16	90				2.0	8.3
		50		50	2.1	8.4
	33	33	33		3.1	8.9

* Average of the monthly ratings.

Ryegrass and Tall Fescue Variety Evaluations - Twenty-one varieties in 5' x 9' plots. Norlea, a dark green selection from Canada, continues to out-perform Common perennial ryegrass in seasonal quality, density, and winter hardiness. Norlea has a slightly improved mowing characteristic, but is susceptible to rust. The experimental selection MSU-15-Lp is promising.

1964 RYEGRASS AND TALL FESCUE VARIETY PERFORMANCE

Variety	Quality Rating** (1-best; 9-poorest)	Density Counts 9/10/64 (Shoots per square inch)	Percent Winterkill
	Perennial Ryegrass		
MSU-15 Lp*	1.4	5.9	15
MSU-8-Lp*	1.4	6.9	40
Norlea	1.7	6.7	8
S-23*	2.4	8.7	45
Pelo*	2.9	7.4	32
Common	5.2	5.0	35
	Tall Fescue		
MSU-3-Fe*	1.3	6.5	16
MSU-5-Fe*	1.4	5.3	16
Syn A*	1.4	4.8	
Kentucky 31	2.3	3.4	16
Alta	2.5	2.8	15

* Experimental selections
** Average of the monthly ratings.

Kentucky 31 tall fescue continues to rank slightly better than Alta in turf quality and density. Several Michigan State selections plus Syn A from Canada are ranking much higher than the commercially available varieties.

Selecting a Fertilization Program

Dr. Paul Rieke

Soil fertility level is one aspect of a turf management program which can be controlled. There are many factors, however, which should be considered in selecting a fertilization program to supplement the natural soil fertility. These include:

1. Soil test - pH preferably in the range 5.5 to 7.2; phosphorus above 25 pounds per acre; and potassium above 140 pounds/acre
2. Season of year - Soil temperature, state of growth of grass.

3. Irrigation level - add 20 - 30%, especially on sandy soils.

4. Clipping removal - add 20 - 40%.

5. Species of grass - management level desired.

6. Form of nitrogen desired and cost per pound of nitrogen.

7. Cost and number of applications.

8. Ease of application.

9. Texture of soil.

Phosphorus and potassium applications may be made in fall, spring, or split applications in fall and spring. During active growth periods "salt-type" fertilizers should be washed into the soil to prevent burning of leaf tissue.

Effect of Pre-emergence Herbicides on Desirable Turfgrass Species

Dr. William Meggitt

Ten pre-emergence herbicides were applied to two year old sods of irrigated Merion Kentucky bluegrass, common Kentucky bluegrass and Pennlawn creeping red fescue in May, 1964. In 1965 a second treatment was applied to those treated in 1964 and additional plots were established to provide single treatments in 1965. The objective of this study is to evaluate the effects of these herbicides on desirable grasses. These studies will include treatments made in a single year as well as repeated applications in subsequent years. Of concern is the immediate effects of these materials, and the ultimate effect on density of desirable species.

In 1964 initial injury to the turf was noted from Zytron, Bandane and Trifluralin. None of the other materials produced observable injury. The injury was manifested as a browning or yellowing of the turf. Pennlawn creeping red fescue was most susceptible to those herbicides producing injury. Some injury was noted on the Kentucky bluegrass while Merion bluegrass did not show injury from any of the herbicides used. Density counts taken in the fall of 1964 did not show any appreciable differences in turf density. Trifluralin was dropped from this study in 1965.

OTHER TURFGRASS RESEARCH CURRENTLY IN PROGRESS

1. Highway Vegetation Studies -- A three year investigation of mulches, grass mixtures, seeding rates, dates, and establishment procedures supported by a $10,500 grant from the Michigan State Highway Department. The location is a four acre area on the north side of I-96 just south of East Lansing. Dr. James Beard.

2. Northern Michigan Turfgrass Investigations -- Bentgrass, bluegrass, red fescue, ryegrass and tall fescue variety mixture, and management studies; plus nitrogen rate, carrier and frequency of application studies are being conducted at the Traverse City Country Club, Traverse City, Michigan. Soil on the site is 91% sand, 6% silt and 3% clay. All studies are being maintained under both irrigated and non-irrigated conditions. Drs. James Beard and Paul Rieke.

3. Fairway Renovation and Improvement Study -- Located at the Cascade Country Club, Grand Rapids. Involves mechanical and chemical methods of reducing the annual bluegrass population and encouraging bentgrass sod formation when maintained under close mowed, irrigated conditions. Comparisons are being made of various methods of seed and vegetative bentgrass establishment. Dr. James Beard.

4. Fertilizer Placement in Relation to Turf Establishment -- Placement of fertilizer relative to seed placement is being studied in terms of germination, seedling growth and root development in the greenhouse and field. Dr. Paul Rieke.

5. Movement of nitrogen, phosphorus, and potassium from surface applications are being studied over a period of years in the field and greenhouse. Dr. Paul Rieke.

6. Sod Production Studies -- Located at the MSU Muck Farm. Investigations include grass mixtures for sod, seed quality, nitrogen rate and frequency, phosphorus and potassium levels and mowing height as they affect sod formation. Drs. Paul Rieke, Robert Lucas and James Beard.

7. Winterkill of Turfgrasses -- Causal factors in winterkill and management factors which can minimize kill. Dr. James Beard.

8. Shade Ecology Study -- Mechanisms of grass adaptation to shade. Dr. James Beard.

9. Turfgrass Breeding -- Red fescue, tall fescue, and ryegrass selection and breeding for improved turf varieties. Dr. Fred Elliott.

INTRODUCING YOUR

MICHIGAN STATE UNIVERSITY

TURFGRASS EXTENSION, RESEARCH, AND TEACHING PERSONNEL

Beard, James B.	-- Assistant Professor of Crop Science, Grass ecology, management and physiology research
Cook, Ray L.	-- Chairman of Soil Science Soil Fertility
Duff, Thomas	--Graduate Teaching Assistant in Crop Science Ph. D. candidate in turfgrass physiology.
Eaton, William J.	-- Turfgrass Technician in Department of Crop Science
Elliott, Fred C.	-- Professor of Crop Science Grass Breeding and Genetics
Harrison, Carter M.	-- Professor of Crop Science Grassland Management
Hildebrand, Stuart C.	-- Assistant Professor of Crop Science Extension Specialist
Knierim, John A.	-- Assistant Professor of Entomology Nematode Research
Lucas, Robert	-- Professor of Soil Science Muck Soils Extension Specialist
Meggitt, William F.	-- Associate Professor of Crop Science Weed Control Research
Nelson, Leyton V.	-- Professor of Crop Science Extension Specialist
Porter, James A.	-- Associate Professor of Soil Science Extension Specialist
Rieke, Paul E.	-- Assistant Professor of Soil Science Soil mixture and turfgrass fertility research
Smith, Nicky A.	-- Assistant Professor of Plant Pathology Disease Extension Specialist
Stoin, Harlan R.	-- Graduate Research Assistant in Crop Science Masters candidate in turfgrass physiology

Tesar, Milo B. -- Acting Chairman of Crop Science

Wallner, William -- Assistant Professor of Entomology
Insect Extension Specialist