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MASSACHUSETTS WEED SCIENCE RESEARCH RESULTS 2008

VOLUME 27

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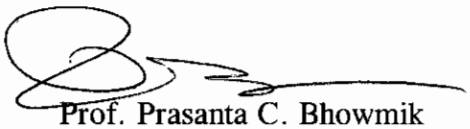
UNIVERSITY OF MASSACHUSETTS AMHERST

PREFACE

The purpose of this report is to inform cooperators in industry, colleagues at other institutions, and other persons interested in weed control, of the results of our research projects conducted in 2008. This information is our annual summary of ongoing field research in Weed Science at the University of Massachusetts, Amherst. Interpretation of the data may be modified by additional experiments. In spite of careful proofreading, there may be some typing or compilation errors in this report. Should you find an obvious error, please bring it to the attention of the author.

Information herein does not constitute a recommendation or endorsement of any product. Current recommendations for weed control in various crop commodities are available from the University of Massachusetts Extension.



Prof. Prasanta C. Bhowmik
Amherst, MA
December 31, 2008

MASSACHUSETTS
WEED SCIENCE RESEARCH RESULTS - 2008

Weed management research in turfgrass environments was conducted by Prof. Prasanta C. Bhowmik at the Joseph Troll Turfgrass Research Center, South Deerfield, MA. Other personnel in weed science research were:

Graduate Research Assistants	Dipayan Sarkar
	Susanna Phoboo

Our field research program is partially funded by grant-in-aid support from industries. The following contributors are gratefully acknowledged for their support of our weed science projects in 2008.

Monsanto – Industrial, Turf & Ornamentals
The Scotts Company
Syngenta Crop Protection
Bayer Crop Protection
Cutting Edge

Appreciation is also extended to others who provided seeds, supplies, equipments, and/or services for these studies. Special thanks to Thom Griffin for his cooperation and help for the entire season.

2008 RESEARCH PROJECTS

Research Projects

Tolerance of turfgrass cultivars: Our studies continue to establish the tolerance of Kentucky bluegrass cultivars under NTEP (172 cultivars) to mesotrione, sulfosulfuron and primisulfuron. We will continue to evaluate new products for their safety to NTEP perennial ryegrass cultivars.

Environmental stress studies: Creeping bentgrass in the cool-season environment undergoes cold acclimation phase in the fall. Often this leads to damages to creeping bentgrass on putting greens or fairways. This project is being designed to understand the cold acclimation phase of creeping bentgrass and phenolic antioxidants in relation to cold temperature, day length and other environmental factors. The role of proline-linked pentose phosphate pathway for phenolic antioxidant production in creeping bentgrass under abiotic stress will be examined. This information on cold acclimation of bentgrass may lead to the development of new cold stress resistant cultivars through genetic manipulation.

Use directions for herbicide treatments. Much of our field research is aimed at gaining information on various phases of herbicide application that will influence specific label directions for herbicide use in various turfgrass species. New herbicides are being evaluated for their efficacy, turfgrass safety, and residual control of weeds under Massachusetts conditions. Herbicide formulations, additives, and antidotes have been included for various turfgrass studies. This is extremely important to the user groups in Massachusetts for weed management under diverse ecological systems. Also, this information leads to Weed Control Recommendation Guide to Turfgrass for all New England States.

Development of low maintenance strategies with growth regulators: Use of growth regulators along with various cultural practices may enhance our weed management practices in turfgrass areas, including golf courses. Spring and fall treatments of growth regulators have been examined for their effectiveness in *Poa annua* control in putting greens. Safety of these growth regulators is being examined carefully in relation to bentgrass growth and development over a period of several years.

Ecological study of chiraito (*Swertia chirayita*): This research aims to study the ecophysiology of chiraito in relation to its environment. It will help in understanding the environmental conditions that affect its phenology and phenotypic characters as well as its phytochemicals. Secondary metabolites will be isolated and characterized for its role in medicinal value to humans as well as to the invasion of this species to different environments.

Biology and management of moss: We have initiated a research project on the biology and invasion of moss under turfgrass environments. Cultural and soil factors will be evaluated for its invasion. Also, studies will be conducted to evaluate various organic products in moss control.

TURFGRASS
DATA COLLECTION METHODS

A. TURFGRASS

I. WEED CONTROL STUDIES. Visual ratings were estimated on weed control throughout the growing season based on a scale of 0 to 100%.

PERCENT WEED CONTROL: Zero percent control meaning the treatment did not affect the weeds in question and the weeds were still present, as in the untreated check plot. One 100% control meaning the treatment was effective and completely controlled the species in question.

WEED COUNTS: Weed counts represent the number of plants or shoots or tillers per unit area or per plot, based on randomly placed 400 cm^2 quadrats in each plot.

II. TOLERANCE STUDIES.
PERCENT TURF INJURY: Turfgrass injury was rated on a scale of 0 to 100%, 0% injury meaning no injury to the turfgrass, and 100% injury meaning the turfgrass is completely dead.

QUALITY AND COLOR. Visual ratings were estimated throughout the growing season. Turf quality and color were rated on a scale of 1 to 9. In our studies, a rating of 6 is commercially acceptable for both turf color and quality.

TURF QUALITY: Turf quality was rated on a scale of 1 to 9, where 1 means dead turfgrass with bare ground, while 9 means a thick, lush stand of turfgrass.

TURF COLOR: Rating of 1 means dead turfgrass with brown color and bare ground, while 9 means a desirable turfgrass with dark green color.

III. GROWTH REGULATOR STUDIES. Various methods were used to determine the effectiveness of various growth regulator treatments.

1. Number of seed heads per unit area (cm^2 or in^2)
2. Percent seed head reductions or suppression
3. Percent top growth reduction, (turf height measurement from clippings)
4. Clippings weight (fresh weight of clippings taken at 2 week intervals)

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Turfgrass

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Tenacity: An Alternative Tool for Weed Management

Prasanta C. Bhowmik and Dipayan Sarkar
Department of Plant, Soil, and Insect Sciences

General

Tenacity™ is a product containing 4 lbs/g of active ingredient, mesotrione. It is a systemic preemergence and postemergence herbicide for the selective control of weeds in turfgrass environments.

When applied preemergence, weeds absorb Tenacity during emergence from the soil. Dry conditions following application may reduce the preemergence activity. When used postemergence, susceptible weeds absorb Tenacity through foliar contact and soil absorption. Weed control is most effective on young, actively growing weeds. Efficacy will be reduced under moisture stress or from applications to mature weeds.

Tenacity is an effective herbicide for weed control prior to or during seeding of certain turfgrass species during turf renovation. If used preemergence in established turfgrass, tank mixtures with preemergence herbicides such as Barricade® (prodiamine) are recommended for longer residual and broad spectrum weed control.

Tenacity can be used in tank mixtures with Barricade (prodiamine), Basagran® (bentazon), Spotlight™ (fluroxypyr), Turflon® ester (triclopyr), Quicksilver™ (carfentrazone), and Vanquish® (dicamba) for weed control and for safety on turfgrasses.

Symptoms

Tenacity is a pigment inhibitor herbicide that controls many susceptible weed species by inhibiting the 4-HPPD enzyme. Foliage of treated weeds cease growth after application, resulting in white color (loss of chlorophyll), and death of weeds may take up to three weeks. Tenacity may cause temporary whitening of treated turfgrass foliage. In general, symptoms appear five to seven days after application and last for two to three weeks.

Weed species controlled

Barnyardgrass, crabgrass, creeping bentgrass, buckhorn plantain, buttercup, carpetweed, chickweeds (common and mouseear), hop clover, white clover and others can be controlled with preemergecne and postemergence applications. However, postemergence treatments of Tenacity can control common dandelion, healall, henbit, oxalis and others. Annual bluegrass infestation can be suppressed with preemergence application of Tenacity.

Presented at the 2008 Turfgrass Field Day, June 18, 2008, Turfgrass Research Center, South Deerfield, MA

Tenacity application

Tenacity at 4 to 8 fl. oz. per acre in 30 to 50 gallons of water per acre can be used prior to weed seed germination. Do not exceed 5 fl. oz. per acre per application to perennial ryegrass or fine fescues or mixed stands that contain greater than 50% perennial ryegrass and/or fine fescue. Tenacity can be combined with a preemergence herbicide such as Barricade (prodiamine) for extended control of key annual monocot weeds such as crabgrass and foxtail. In established turfgrass, Tenacity is more effective as a postemergence application unless combined with another soil active herbicide. Use Tenacity at 4 to 8 fl. oz. per acre in 30 to 50 gallons of water per acre. A repeat application at two to three weeks may be required for adequate weed control. A non-ionic surfactant (such as X-77) should be added in all postemergence applications.

New turfgrass seeding

Use Tenacity at 5-8 fl. oz. per acre in 30 to 50 gallons of water per acre prior to seeding or post seeding of tolerant turfgrass species listed on this label, except fine fescue. Tenacity may reduce density of fine fescue seedlings. Tenacity can be used on grass seed blends that contain less than 20% by weight of hard or fine fescue. Tenacity will control many grassy and broadleaf weeds that compete with and slow the establishment of the turfgrass stands. Apply at grass seeding or close to seeding for best performance. Avoid spraying on newly germinated turfgrass seedlings. Wait until the newly germinated turfgrass has been mowed two times (green-up) or four weeks after emergence (whichever is longer) before making a postemergence application.

Golf courses

Tenacity may be used for weed control in golf courses and sod farms. **Do not use this product on golf course putting greens**. When Tenacity is used, it is recommended to maintain a five foot buffer between treated areas and putting greens. Tenacity can be used at 5 to 8 fl. oz per acre in Kentucky bluegrass, tall fescue, perennial ryegrass and fine fescues (creeping red, chewing and hard).

Control of bentgrass (*Agrostis* species)

Creeping bentgrass is sensitive to Tenacity. Use Tenacity at 5 fl. oz. per acre with a nonionic surfactant in 30 to 50 gallons of water per acre. Two to three applications at two to three week interval may be necessary for effective control. Applications may be more effective in the late summer/early fall just prior to onset of renewed bentgrass growth, than spring/early summer applications. Do not apply more than 16 oz. of Tenacity per acre per year or per crop (equivalent to a maximum of 0.50 lb. of mesotrione per acre per year), whichever is shorter.

UNIVERSITY OF MASSACHUSETTS-AMHERST

COMPARISON OF VARIOUS FORMULATIONS OF ETHOFUMESATE ON KENTUCKY BLUEGRASS

Trial ID: 0851TG1 Study Dir.: Prof. P. C. Bhowmik
Location: Turf Res. Center Investigator: PRASANTA C. BHOWMIK

GENERAL TRIAL INFORMATION

Study Director: Prof. P. C. Bhowmik **Title:** _____
Affiliation: Univ. of Massachusetts **Postal Code:** _____

Investigator: P. C. Bhowmik and R. Hanrahan **Title:** _____
Affiliation: _____ **Postal Code:** _____

Trial Status: Current **Initiation Date:** _____ **Country:** _____
City: South Deerfield **State/Prov.:** _____ **Postal Code:** _____
Conducted Under GLP (Y/N): N **Conducted Under GEP (Y/N):** N

Objective: To compare various frormulations.

Conclusions:

CROP AND PEST DESCRIPTION

Weed 1._____ _____ 2._____ _____

Crop 1: POAPR _____ **Variety:** _____ **Planting Date:** _____
Planting Method: Established stand **Rate:** _____ _____ **Depth:** _____
Perennial Age: _____ **Row Spacing:** _____ **Seed Bed:** _____
Soil Temperature: _____ **Soil Moisture:** _____ **Emergence Date:** _____

Plot Width, Unit: 3.5 FT **Plot Length, Unit:** 10 FT **Reps:** 4
Site Type: _____
Tillage Type: _____ **Study Design:** RANDOMIZED COMPLETE BLOCK
Trial Initiation Comments: _____

Previous:	Crops	Pesticides	Year
1.			

MAINTENANCE

Field Prep./Maintenance: Low maintenance N @0.5 lb/1000 sq. ft. per year

No.	Date	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit
1.							

SOIL DESCRIPTION

Texture: _____ **% OM:** _____ **% Sand:** _____ **% Silt:** _____ **% Clay:** _____
pH: _____ **CEC:** _____ **Soil Name:** _____ **Fertility Level:** _____

MOISTURE CONDITIONS

On:	Date	Time	Amount	Unit	Type	Interval	Unit
1.							

Overall Moisture Conditions: _____
Closest Weather Station: _____ **Distance:** _____ **Unit:** _____

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APPLICATION DESCRIPTION

	A	B	C	D	E	F
Application Date:	Sep-26-07					
Time of Day:	A.M.					
Application Method:	Spray					
Application Timing:	POST					
Applic. Placement:						
Air Temp., Unit:	84 F					
% Relative Humidity:	42					
Wind Velocity, Unit:	5 MPH					
Dew Presence (Y/N):	N					
Water Hardness:						
Soil Temp., Unit:	73.5 F	72.0 F				
Soil Moisture:	@ 0.5"	@ 2.0"				
% Cloud Cover:	0					

CROP STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Crop 1 POAPR Stage:						
Stage Scale:						
Height, Unit:						

WEED STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Weed 1 _____ Stage:						
Stage Scale:						
Density, Unit:						

APPLICATION EQUIPMENT

	A	B	C	D	E	F
Appl. Equipment:	BACKPACK					
Operating Pressure:	22 PSI					
Nozzle Type:	TEEJET					
Nozzle Size:	1104 VS					
Nozzle Spacing, Unit:	20 INCH					
Nozzles/Row:						
Band Width, Unit:						
Boom Length, Unit:						
Boom Height, Unit:	17 INCH					
Ground Speed, Unit:						
Incorporation Equip.:						
Hours to Incorp.:						
Incorp. Depth, Unit:						
Carrier:	WATER					
Spray Volume, Unit:	50 GPA					
Spray pH:						
Propellant:						
Tank Mix (Y/N):						

Trt No	Treatment Application Comment

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COMPARISON OF VARIOUS FORMULATIONS OF ETHOFUMESATE ON KENTUCKY BLUEGRASS

Trial ID: 0851TG1 Study Dir.: Prof. P. C. Bhowmik
Location: Turf Res. Center Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	POAPR PHYTO PERCENT Oct-02-07 6 DA-A	POAPR PHYTO PERCENT Apr-24-08 211 DA-A	POAPR PHYTO PERCENT May-01-08 218 DA-A
01	UNTREATED	0		0			0.0 a	0.0 a	0.0 a
02	PROGRASS	180	EC	1.5	FL OZ/1000 FT2	A+21DA	0.0 a	2.5 a	2.5 a
03	PROGRASS SC	480	SC	0.563	FL OZ/1000 FT2	A+21DA	0.0 a	2.5 a	2.5 a
04	PROGRASS SC MSO	480	SC L	0.563 1	FL OZ/1000 FT2 QT/A	A+21DA	0.0 a	8.8 a	3.8 a
05	POACONSTRICTOR	480	EC	0.563	FL OZ/1000 FT2	A+21DA	0.0 a	7.5 a	2.5 a
	LSD (P=.05)						0.00	8.20	8.78
	Standard Deviation						0.00	5.32	5.70
	CV						0.0	125.24	253.37
	Bartlett's X2						0.0	0.235	0.767
	P(Bartlett's X2)						0.00*	0.972	0.857

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

COMPARISON OF VARIOUS FORMULATIONS OF ETHOFUMESATE ON KENTUCKY BLUEGRASS

Trial ID: 0851TG1 Study Dir.: Prof. P. C. Bhowmik
Location: Turf Res. Center Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	POAPR PHYTO PERCENT May-13-08 230 DA-A	POAPR PHYTO PERCENT Jun-27-08 250 DA-A	POAPR PHYTO PERCENT Jul-18-08 296 DA-A
01	UNTREATED	0		0			1.3 a	0.0 a	0.0 a
02	PROGRASS	180	EC	1.5	FL OZ/1000 FT2	A+21DA	2.5 a	0.0 a	0.0 a
03	PROGRASS SC	480	SC	0.563	FL OZ/1000 FT2	A+21DA	0.0 a	0.5 a	0.5 a
04	PROGRASS SC MSO	480	SC L	0.563 1	FL OZ/1000 FT2 QT/A	A+21DA	2.5 a	0.0 a	0.0 a
05	POACONSTRICTOR	480	EC	0.563	FL OZ/1000 FT2	A+21DA	0.0 a	0.0 a	0.0 a
	LSD (P=.05)						3.59	0.69	0.69
	Standard Deviation						2.33	0.45	0.45
	CV						186.19	447.21	447.21
	Bartlett's X2						0.075	0.0	0.0
	P(Bartlett's X2)						0.963	0.00*	0.00*

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

SAFETY OF PERENNIAL RYEGRASS TO VARIOUS FORMULATIONS OF TENACITY

Trial ID: 0852TG2A Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

GENERAL TRIAL INFORMATION

Study Director: Prof. Bhowmik **Title:** _____
Affiliation: Univ. of Massachusetts **Postal Code:** _____

Investigator: P. C. Bhowmik, D. Sarkar and D. Lycan **Title:** _____
Affiliation: _____ **Postal Code:** _____

Trial Status: Completed **Initiation Date:** _____ **Country:** _____
City: South Deerfield **State/Prov.:** MA **Postal Code:** _____
Conducted Under GLP (Y/N): N **Conducted Under GEP (Y/N):** N

Objective: To determine the safety of perennial ryegrass to Tenacity formulations

Conclusions:

CROP AND PEST DESCRIPTION

Weed 1.DIGSA _____ 2._____ _____

Crop 1:LOLPE _____ **Variety:** _____ **Planting Date:** Jun-03-08
Planting Method: New seeding **Rate:** _____ _____ **Depth:** ____ __
Perennial Age: ____ _____ **Row Spacing:** ____ _____ **Seed Bed:** _____
Soil Temperature: ____ _ **Soil Moisture:** _____ **Emergence Date:** _____

Plot Width, Unit: 3.5 FT **Plot Length, Unit:** 10 FT **Reps:** 4
Site Type: _____
Tillage Type: _____ **Study Design:** RANDOMIZED COMPLETE BLOCK
Trial Initiation Comments: A blanket application of Roundup was made to the existing vegetation on May 15. The area was prepared for seeding.

Previous:	Crops	Pesticides	Year
1.	_____	_____	____

MAINTENANCE

Field Prep./Maintenance: Low maintenance

No.	Date	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit
1.	_____	_____	_____	_____	___	_____	_____

APPLICATION DESCRIPTION

	A	B	C	D	E	F
Application Date:	May-15-08	_____	Jun-04-08	_____	Jun-20-08	_____
Time of Day:	NOON	_____	PM	_____	AM	_____
Application Method:	SPRAY	_____	SPRAY	_____	SPRAY	_____
Application Timing:	POST	_____	SEEDING	_____	POST	_____
Applic. Placement:	_____	_____	_____	_____	_____	_____
Air Temp., Unit:	64 F	____ _	62 F	____ _	69 F	____ _
% Relative Humidity:	44	_____	68	_____	43.2	_____
Wind Velocity, Unit:	2 MPH	____ ____	5 MPH	____ ____	0 MPH	____ ____
Dew Presence (Y/N):	_	_	_	_	_	_
Water Hardness:	_____	_____	_____	_____	_____	_____
Soil Temp., Unit:	61 F	58.4 F	66.5 F	66.5 F	73.7 F	70 F
Soil Moisture:	@ 0.5"	@ 2.0"	@ 0.5"	@ 2.0"	@ 0.5"	@ 2.0"
% Cloud Cover:	85	_____	80	_____	50	_____

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CROP STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Crop 1 LOLPE Stage:						
Stage Scale:						
Height, Unit:						

WEED STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Weed 1 DIGSA Stage:						
Stage Scale:						
Density, Unit:						

APPLICATION EQUIPMENT

	A	B	C	D	E	F
Appl. Equipment:	BACKPACK					
Operating Pressure:	22PSI					
Nozzle Type:	TEEJET					
Nozzle Size:	1104 VS					
Nozzle Spacing, Unit:	20 INCH					
Nozzles/Row:						
Band Width, Unit:						
Boom Length, Unit:						
Boom Height, Unit:	17 INCH					
Ground Speed, Unit:						
Incorporation Equip.:						
Hours to Incorp.:						
Incorp. Depth, Unit:						
Carrier:	WATER					
Spray Volume, Unit:	50 GPA					
Spray pH:						
Propellant:						
Tank Mix (Y/N):						

Trt No	Treatment Application Comment

UNIVERSITY OF MASSACHUSETTS-AMHERST

SAFETY OF PERENNIAL RYEGRASS TO VARIOUS FORMULATIONS OF TENACITY

Trial ID: 0852TG2A Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	LOLPE PHYTO PERCENT Jun-06-08 22 DA-A	LOLPE PHYTO PERCENT Jun-17-08 33 DA-A	LOLPE PHYTO PERCENT Jun-23-08 39 DA-A	LOLPE PHYTO PERCENT Jun-27-08 43 DA-A
01	UNTREATED CHECK						0.0 a	0.0 a	0.0 c	0.0 e
02	A12738	480	SC	5	OZ/A	SEEDIN	0.0 a	0.0 a	3.0 bc	1.5 de
	A12738	480	SC	5	OZ/A	SEED +				
	ACTIVATOR			0.25	% V/V	POST				
03	A12738	480	SC	8	OZ/A	SEEDIN	0.0 a	0.0 a	5.5 b	6.8 bc
	A12738	480	SC	8	OZ/A	SEED +				
	ACTIVATOR			0.25	% V/V	POST				
04	EXC3937	240	SC	10	OZ/A	SEEDIN	0.0 a	0.0 a	3.5 bc	2.8 cde
	EXC3937	240	SC	10	OZ/A	SEED +				
	ACTIVATOR			0.25	% V/V	POST				
05	EXC3937	240	SC	16	OZ/A	SEEDIN	0.0 a	0.0 a	4.3 bc	5.0 bcd
	EXC3937	240	SC	16	OZ/A	SEED +				
	ACTIVATOR			0.25	% V/V	POST				
06	A14203	50	WG	0.156	LB A/A	SEEDIN	0.0 a	0.0 a	2.8 bc	2.8 cde
	A14203	50	WG	0.156	LB A/A	SEED +				
	ACTIVATOR			0.25	% V/V	POST				
07	A14203	50	WG	0.25	LB A/A	SEEDIN	0.0 a	0.0 a	6.8 b	7.5 b
	A14203	50	WG	0.25	LB A/A	SEED +				
	ACTIVATOR			0.25	% V/V	POST				
08	A12738	480	SC	8	OZ/A	SEEDIN	0.0 a	0.0 a	0.0 c	0.0 e
09	A12738	480	SC	8	OZ/A	SEED +	0.0 a	0.0 a	11.3 a	11.3 a
	ACTIVATOR			0.25	% V/V	POST				
LSD (P=.05)							0.00	0.00	3.44	3.08
Standard Deviation							0.00	0.00	2.36	2.11
CV							0.0	0.0	57.4	50.7
Bartlett's X2							0.0	0.0	4.815	10.007
P(Bartlett's X2)							0.00*	0.00*	0.568	0.075

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

SAFETY OF PERENNIAL RYEGRASS TO VARIOUS FORMULATIONS OF TENACITY

Trial ID: 0852TG2A Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	LOLPE PHYTO PERCENT Jul-07-08 53 DA-A	DIGSA CONTROL PERCENT Jul-18-08 64 DA-A	POROL CONTROL PERCENT Jul-18-08 64 DA-A	DIGSA COVER PERCENT Aug-01-08 78 DA-A
01	UNTREATED CHECK						0.0 a	0.0 e	0.0 e	100.0 a
02	A12738	480	SC	5	OZ/A	SEEDIN	0.0 a	83.8 abc	80.0 abc	9.8 de
	A12738	480	SC	5	OZ/A	SEED +				
	ACTIVATOR			0.25	% V/V	POST				
03	A12738	480	SC	8	OZ/A	SEEDIN	0.0 a	92.5 ab	86.3 ab	3.3 de
	A12738	480	SC	8	OZ/A	SEED +				
	ACTIVATOR			0.25	% V/V	POST				
04	EXC3937	240	SC	10	OZ/A	SEEDIN	0.0 a	78.8 bc	65.0 c	21.3 cd
	EXC3937	240	SC	10	OZ/A	SEED +				
	ACTIVATOR			0.25	% V/V	POST				
05	EXC3937	240	SC	16	OZ/A	SEEDIN	0.0 a	93.5 ab	85.0 ab	7.3 de
	EXC3937	240	SC	16	OZ/A	SEED +				
	ACTIVATOR			0.25	% V/V	POST				
06	A14203	50	WG	0.156	LB A/A	SEEDIN	0.0 a	93.5 ab	86.3 ab	5.3 de
	A14203	50	WG	0.156	LB A/A	SEED +				
	ACTIVATOR			0.25	% V/V	POST				
07	A14203	50	WG	0.25	LB A/A	SEEDIN	0.0 a	97.5 a	95.0 a	1.5 e
	A14203	50	WG	0.25	LB A/A	SEED +				
	ACTIVATOR			0.25	% V/V	POST				
08	A12738	480	SC	8	OZ/A	SEEDIN	0.0 a	63.8 d	72.5 bc	40.0 b
09	A12738	480	SC	8	OZ/A	SEED +	0.0 a	76.3 c	47.5 d	30.0 bc
	ACTIVATOR			0.25	% V/V	POST				
LSD (P=.05)							0.00	10.43	12.74	12.89
Standard Deviation							0.00	7.15	8.73	8.83
CV							0.0	9.47	12.72	36.41
Bartlett's X2							0.0	7.437	6.699	33.85
P(Bartlett's X2)							0.00*	0.385	0.461	0.001*

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

SAFETY OF PERENNIAL RYEGRASS TO VARIOUS FORMULATIONS OF TENACITY - SULFOSULFURON

Trial ID: 0852TG2B Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

GENERAL TRIAL INFORMATION

Study Director: Prof. Bhowmik **Title:** _____
Affiliation: _____ **Postal Code:** _____

Investigator: P. C. Bhowmik and D. Sarkar **Title:** _____
Affiliation: _____ **Postal Code:** _____

Trial Status: _____ **Initiation Date:** _____ **Country:** _____
City: _____ **State/Prov.:** _____ **Postal Code:** _____
Conducted Under GLP (Y/N): N **Conducted Under GEP (Y/N):** N

Objective: To determine the safety of perennial ryegrass to Tenacity formulations

Conclusions:

CROP AND PEST DESCRIPTION

Weed 1.DIGSA _____ 2._____ _____

Crop 1:LOLPE _____ **Variety:** _____ **Planting Date:** Jun-03-08
Planting Method: New seeding **Rate:** _____ _____ **Depth:** ____ __
Perennial Age: ____ _____ **Row Spacing:** ____ _____ **Seed Bed:** _____
Soil Temperature: ____ _ **Soil Moisture:** _____ **Emergence Date:** _____

Plot Width, Unit: 3.5 FT **Plot Length, Unit:** 10 FT **Reps:** 4
Site Type: _____
Tillage Type: _____ **Study Design:** RANDOMIZED COMPLETE BLOCK
Trial Initiation Comments: A blanket application of sulfosulfuron and glyphosate was made to the existing vegetation on May 15.

Previous:	Crops	Pesticides	Year
1.	_____	_____	____

MAINTENANCE

Field Prep./Maintenance: Low maiintenance

No.	Date	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit
1.	_____	_____	____	_____	____	_____	_____

APPLICATION DESCRIPTION

	A	B	C	D	E	F
Application Date:	May-15-08	_____	Jun-04-08	_____	Jun-20-08	_____
Time of Day:	NOON	_____	PM	_____	AM	_____
Application Method:	SPRAY	_____	SPRAY	_____	SPRAY	_____
Application Timing:	POST	_____	AT SEED	_____	POST	_____
Applic. Placement:	_____	_____	_____	_____	_____	_____
Air Temp., Unit:	64 F	____ _	62 F	____ _	69 F	____ _
% Relative Humidity:	44	_____	68	_____	43.2	_____
Wind Velocity, Unit:	2 MPH	____ ____	5 MPH	____ ____	0 MPH	____ ____
Dew Presence (Y/N):	_	_	_	_	_	_
Water Hardness:	_____	_____	_____	_____	_____	_____
Soil Temp., Unit:	61 F	58.4 F	66.5 F	66.5 F	73.7 F	70 F
Soil Moisture:	_____	_____	_____	_____	_____	_____
% Cloud Cover:	85	_____	80	_____	50	_____

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CROP STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Crop 1 LOLPE Stage:						
Stage Scale:						
Height, Unit:						

WEED STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Weed 1 DIGSA Stage:						
Stage Scale:						
Density, Unit:						

APPLICATION EQUIPMENT

	A	B	C	D	E	F
Appl. Equipment:	BACKPACK					
Operating Pressure:	22PSI					
Nozzle Type:	TEEJET					
Nozzle Size:	1104 VS					
Nozzle Spacing, Unit:	20 INCH					
Nozzles/Row:						
Band Width, Unit:						
Boom Length, Unit:						
Boom Height, Unit:	17 INCH					
Ground Speed, Unit:						
Incorporation Equip.:						
Hours to Incorp.:						
Incorp. Depth, Unit:						
Carrier:	WATER					
Spray Volume, Unit:	50 GPA					
Spray pH:						
Propellant:						
Tank Mix (Y/N):						

Trt No	Treatment Application Comment

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SAFETY OF PERENNIAL RYEGRASS TO VARIOUS FORMULATIONS OF TENACITY - SULFOSULFURON

Trial ID: 0852TG2B Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	LOLPE PHYTO PERCENT Jun-11-08 27 DA-A	LOLPE PHYTO PERCENT Jun-17-08 33 DA-A	LOLPE PHYTO PERCENT Jun-23-08 39 DA-A	LOLPE PHYTO PERCENT Jun-27-08 43 DA-A
01	UNTREATED CHECK						0.0 a	0.0 a	0.0 c	0.0 c
02	A12738	480	SC	5	OZ/A	SEEDIN	0.0 a	0.0 a	2.3 bc	2.3 bc
	A12738	480	SC	5	OZ/A	SEEDIN				
	ACTIVATOR			0.25	% V/V	SEEDIN				
03	A12738	480	SC	8	OZ/A	SEEDIN	0.0 a	0.0 a	3.5 b	3.5 b
	A12738	480	SC	8	OZ/A	SEEDIN				
	ACTIVATOR			0.25	% V/V	SEEDIN				
04	EXC3937	240	SC	10	OZ/A	SEEDIN	0.0 a	0.0 a	2.8 bc	2.0 bc
	EXC3937	240	SC	10	OZ/A	SEEDIN				
	ACTIVATOR			0.25	% V/V	SEEDIN				
05	EXC3937	240	SC	16	OZ/A	SEEDIN	0.0 a	0.0 a	3.5 b	4.3 b
	EXC3937	240	SC	16	OZ/A	SEEDIN				
	ACTIVATOR			0.25	% V/V	SEEDIN				
06	A14203	50	WG	0.156	LB A/A	SEEDIN	0.0 a	0.0 a	1.5 bc	2.8 bc
	A14203	50	WG	0.156	LB A/A	SEEDIN				
	ACTIVATOR			0.25	% V/V	SEEDIN				
07	A14203	50	WG	0.25	LB A/A	SEEDIN	0.0 a	0.0 a	4.3 b	4.3 b
	A14203	50	WG	0.25	LB A/A	SEEDIN				
	ACTIVATOR			0.25	% V/V	SEEDIN				
08	A12738	480	SC	8	OZ/A	SEEDIN	0.0 a	0.0 a	0.0 c	0.0 c
09	A12738	480	SC	8	OZ/A	SEEDIN	0.0 a	0.0 a	8.8 a	8.8 a
	ACTIVATOR			0.25	% V/V	SEEDIN				
	LSD (P=.05)						0.00	0.00	1.98	2.18
	Standard Deviation						0.00	0.00	1.36	1.49
	CV						0.0	0.0	46.04	48.45
	Bartlett's X2						0.0	0.0	2.537	1.364
	P(Bartlett's X2)						0.00*	0.00*	0.864	0.928

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

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SAFETY OF PERENNIAL RYEGRASS TO VARIOUS FORMULATIONS OF TENACITY - SULFOSULFURON

Trial ID: 0852TG2B Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	LOLPE PHYTO PERCENT Jul-07-08 53 DA-A	DIGSA CONTROL PERCENT Jul-18-08 64 DA-A	POROL CONTROL PERCENT Jul-18-08 64 DA-A	DIGSA COVER PERCENT Aug-01-08 78 DA-A
01	UNTREATED CHECK						0.0 a	0.0 d	0.0 d	100.0 a
02	A12738	480	SC	5	OZ/A	SEEDIN	0.0 a	78.8 bc	72.5 b	10.3 cd
	A12738	480	SC	5	OZ/A	SEEDIN				
	ACTIVATOR			0.25	% V/V	SEEDIN				
03	A12738	480	SC	8	OZ/A	SEEDIN	0.0 a	97.5 ab	88.8 a	1.5 e
	A12738	480	SC	8	OZ/A	SEEDIN				
	ACTIVATOR			0.25	% V/V	SEEDIN				
04	EXC3937	240	SC	10	OZ/A	SEEDIN	0.0 a	78.8 bc	81.3 ab	8.8 cde
	EXC3937	240	SC	10	OZ/A	SEEDIN				
	ACTIVATOR			0.25	% V/V	SEEDIN				
05	EXC3937	240	SC	16	OZ/A	SEEDIN	0.0 a	100.0 a	88.8 a	2.0 e
	EXC3937	240	SC	16	OZ/A	SEEDIN				
	ACTIVATOR			0.25	% V/V	SEEDIN				
06	A14203	50	WG	0.156	LB A/A	SEEDIN	0.0 a	90.0 ab	86.3 ab	5.3 de
	A14203	50	WG	0.156	LB A/A	SEEDIN				
	ACTIVATOR			0.25	% V/V	SEEDIN				
07	A14203	50	WG	0.25	LB A/A	SEEDIN	0.0 a	98.8 a	92.5 a	2.0 e
	A14203	50	WG	0.25	LB A/A	SEEDIN				
	ACTIVATOR			0.25	% V/V	SEEDIN				
08	A12738	480	SC	8	OZ/A	SEEDIN	0.0 a	81.3 abc	83.8 ab	13.8 c
09	A12738	480	SC	8	OZ/A	SEEDIN	0.0 a	67.5 c	52.5 c	21.3 b
	ACTIVATOR			0.25	% V/V	SEEDIN				
	LSD (P=.05)						0.00	13.19	10.79	5.42
	Standard Deviation						0.00	9.04	7.39	3.71
	CV						0.0	11.75	10.29	20.29
	Bartlett's X2						0.0	8.416	7.185	17.956
	P(Bartlett's X2)						0.00*	0.209	0.41	0.006*

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

POSTEMERGENCE CONTROL OF LARGE CRABGRASS

Trial ID: 0853TG3 Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

GENERAL TRIAL INFORMATION

Study Director: Prof. Bhowmik **Title:** _____
Affiliation: _____ **Postal Code:** _____

Investigator: P. C. Bhowmik, D. Sarkar and K. Miller **Title:** _____
Affiliation: _____ **Postal Code:** _____

Trial Status: _____ **Initiation Date:** _____ **Country:** _____
City: _____ **State/Prov.:** _____ **Postal Code:** _____
Conducted Under GLP (Y/N): N **Conducted Under GEP (Y/N):** N

Objective: Postemergence activity of Drive with various adjuvants

Conclusions:

CROP AND PEST DESCRIPTION

Weed 1.DIGSA _____ 2._____ _____

Crop 1:POAPR _____ **Variety:** _____ **Planting Date:** _____
Planting Method: _____ **Rate:** _____ _____ **Depth:** ____ __
Perennial Age: 3 year **Row Spacing:** ____ _____ **Seed Bed:** _____
Soil Temperature: ____ _ **Soil Moisture:** _____ **Emergence Date:** _____

Plot Width, Unit: 3.5 FT **Plot Length, Unit:** 10 FT **Reps:** 3
Site Type: _____
Tillage Type: _____ **Study Design:** RANDOMIZED COMPLETE BLOCK
Trial Initiation Comments: _____
_____

Previous:	Crops	Pesticides	Year
1.	_____	_____	____

MAINTENANCE

Field Prep./Maintenance: Low maintenance

No.	Date	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit
1.	_____	_____	____	_____	___	_____	_____

SOIL DESCRIPTION

Texture: _____ **% OM:** ____ **% Sand:** ____ **% Silt:** ____ **% Clay:** ____
pH: ____ **CEC:** ____ **Soil Name:** _____ **Fertility Level:** _____

MOISTURE CONDITIONS

On:	Date	Time	Amount	Unit	Type	Interval	Unit
1.	_____	_____	_____	__	_____	_____	___

Overall Moisture Conditions: _____
Closest Weather Station: _____ **Distance:** _____ **Unit:** __

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APPLICATION DESCRIPTION

	A	B	C	D	E	F
Application Date:	Jun-10-08					
Time of Day:	AM					
Application Method:	SPRAY					
Application Timing:	POST					
Applic. Placement:						
Air Temp., Unit:	88.7 F					
% Relative Humidity:	50.2					
Wind Velocity, Unit:	0					
Dew Presence (Y/N):						
Water Hardness:						
Soil Temp., Unit:	80.6 F	77.0 F				
Soil Moisture:	@ 0.5"	@ 2.00"				
% Cloud Cover:						

CROP STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Crop 1 POAPR Stage:						
Stage Scale:						
Height, Unit:						

WEED STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Weed 1 DIGSA Stage:	1-3 Leaf					
Stage Scale:						
Density, Unit:						

APPLICATION EQUIPMENT

	A	B	C	D	E	F
Appl. Equipment:	BACKPACK					
Operating Pressure:	22PSI					
Nozzle Type:	TEEJET					
Nozzle Size:	1104 VS					
Nozzle Spacing, Unit:	20 INCH					
Nozzles/Row:						
Band Width, Unit:						
Boom Length, Unit:						
Boom Height, Unit:	17 INCH					
Ground Speed, Unit:						
Incorporation Equip.:						
Hours to Incorp.:						
Incorp. Depth, Unit:						
Carrier:	WATER					
Spray Volume, Unit:	50 GPA					
Spray pH:						
Propellant:						
Tank Mix (Y/N):						

Trt No	Treatment Application Comment

UNIVERSITY OF MASSACHUSETTS-AMHERST

POSTEMERGENCE CONTROL OF LARGE CRABGRASS

Trial ID: 0853TG3 Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	DIGSA CONTROL PERCENT Jun-13-08 3 DA-A	DIGSA CONTROL PERCENT Jun-17-08 7 DA-A	DIGSA CONTROL PERCENT Jun-27-08 17 DA-A	BR WEED CONTROL PERCENT Jun-27-08 17 DA-A
01	DRIVE XLR8	180	L	1.5	FL OZ/1000 FT2	POST	0.0 b	65.0 b	71.7 a	56.7 a
02	DRIVE XLR8 MSO	180	L	1.5 1.0	FL OZ/1000 FT2 % V/V	POST POST	68.3 a	76.7 ab	78.3 a	66.7 a
03	DRIVE XLR8 CROP OIL	180	L	1.5 1.0	FL OZ/1000 FT2 % V/V	POST POST	55.0 a	76.7 ab	76.7 a	80.0 a
04	DRIVE XLR8 NIS (X-77)	180	L	1.5 0.25	FL OZ/1000 FT2 % V/V	POST POST	41.7 ab	86.7 a	81.7 a	71.7 a
05	PROSHOT MSO	25	EC	0.50 1.0	LB A/A % V/V	POST POST	25.0 ab	6.7 c	23.3 bc	43.3 a
06	PROSHOT MSO	25	EC	0.75 1.0	LB A/A % V/V	POST POST	23.3 ab	15.0 c	33.3 b	53.3 a
07	UNTREATED CHECK						0.0 b	0.0 c	0.0 c	0.0 b
	LSD (P=.05)						33.75	15.29	25.16	29.99
	Standard Deviation						18.97	8.59	14.14	16.86
	CV						62.25	18.41	27.12	31.75
	Bartlett's X2						10.788	4.691	5.777	7.522
	P(Bartlett's X2)						0.029*	0.455	0.329	0.111

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

POSTEMERGENCE CONTROL OF LARGE CRABGRASS

Trial ID: 0853TG3 Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	DIGSA CONTROL PERCENT Jul-07-08 27 DA-A	DIGSA CONTROL PERCENT Jul-18-08 38 DA-A	BR WEED CONTROL PERCENT Jul-18-08 38 DA-A	DIGSA COVER PERCENT Aug-01-08 52 DA-A
01	DRIVE XLR8	180	L	1.5	FL OZ/1000 FT2	POST	56.7 a	16.7 a	6.7 a	85.0 a
02	DRIVE XLR8 MS0	180	L	1.5 1.0	FL OZ/1000 FT2 % V/V	POST POST	75.0 a	30.0 a	20.0 a	83.3 a
03	DRIVE XLR8 CROP OIL	180	L	1.5 1.0	FL OZ/1000 FT2 % V/V	POST POST	70.0 a	23.3 a	6.7 a	86.7 a
04	DRIVE XLR8 NIS (X-77)	180	L	1.5 0.25	FL OZ/1000 FT2 % V/V	POST POST	85.0 a	20.0 a	10.0 a	73.3 a
05	PROSHOT MS0	25	EC	0.50 1.0	LB A/A % V/V	POST POST	5.0 b	0.0 a	0.0 a	98.3 a
06	PROSHOT MS0	25	EC	0.75 1.0	LB A/A % V/V	POST POST	6.7 b	0.0 a	0.0 a	98.3 a
07	UNTREATED CHECK						0.0 b	0.0 a	0.0 a	100.0 a
	LSD (P=.05)						29.61	21.56	16.77	18.40
	Standard Deviation						16.64	12.12	9.43	10.34
	CV						39.05	94.24	152.3	11.58
	Bartlett's X2						5.333	0.938	2.03	11.429
	P(Bartlett's X2)						0.377	0.816	0.566	0.044*

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

PERFORMANCE OF ROUNDUP PROMAX

Trial ID: 0854TG4 Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

GENERAL TRIAL INFORMATION

Study Director: Prof. Bhowmik Title: _____
Affiliation: _____ Postal Code: _____

Investigator: P. C. Bhowmik, D. Sarkar and S. McCann Title: _____
Affiliation: _____ Postal Code: _____

Trial Status: _____ Initiation Date: _____ Country: _____
City: _____ State/Prov.: _____ Postal Code: _____
Conducted Under GLP (Y/N): N Conducted Under GEP (Y/N): N

Objective:

Conclusions:

CROP AND PEST DESCRIPTION

Weed 1. _____ 2. _____

Crop 1: _____ Variety: _____ Planting Date: _____
Planting Method: _____ Rate: _____ Depth: _____
Perennial Age: _____ Row Spacing: _____ Seed Bed: _____
Soil Temperature: _____ Soil Moisture: _____ Emergence Date: _____

Plot Width, Unit: 3.5 FT Plot Length, Unit: 10 FT Reps: 4
Site Type: _____
Tillage Type: _____ Study Design: RANDOMIZED COMPLETE BLOCK
Trial Initiation Comments: _____

Previous:	Crops	Pesticides	Year
1.			

MAINTENANCE

Field Prep./Maintenance: _____

No.	Date	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit
1.							

SOIL DESCRIPTION

Texture: _____ % OM: _____ % Sand: _____ % Silt: _____ % Clay: _____
pH: _____ CEC: _____ Soil Name: _____ Fertility Level: _____

MOISTURE CONDITIONS

On:	Date	Time	Amount	Unit	Type	Interval	Unit
1.							

Overall Moisture Conditions: _____
Closest Weather Station: _____ Distance: _____ Unit: _____

UNIVERSITY OF MASSACHUSETTS-AMHERST

APPLICATION DESCRIPTION

	A	B	C	D	E	F
Application Date:	Jun-10-08					
Time of Day:	AM					
Application Method:	SPRAY					
Application Timing:	POST					
Applic. Placement:						
Air Temp., Unit:	88.7 F					
% Relative Humidity:	50.2					
Wind Velocity, Unit:	0					
Dew Presence (Y/N):						
Water Hardness:						
Soil Temp., Unit:	80.6 F	77.0 F				
Soil Moisture:						
% Cloud Cover:						

CROP STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Crop 1 _____ Stage:						
Stage Scale:						
Height, Unit:						

WEED STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Weed 1 _____ Stage:						
Stage Scale:						
Density, Unit:						

APPLICATION EQUIPMENT

	A	B	C	D	E	F
Appl. Equipment:	BACKPACK					
Operating Pressure:	22PSI					
Nozzle Type:	TEEJET					
Nozzle Size:	1104 VS					
Nozzle Spacing, Unit:	20 INCH					
Nozzles/Row:						
Band Width, Unit:						
Boom Length, Unit:						
Boom Height, Unit:	17 INCH					
Ground Speed, Unit:						
Incorporation Equip.:						
Hours to Incorp.:						
Incorp. Depth, Unit:						
Carrier:	WATER					
Spray Volume, Unit:	50 GPA					
Spray pH:						
Propellant:						
Tank Mix (Y/N):						

Trt No	Treatment Application Comment

UNIVERSITY OF MASSACHUSETTS-AMHERST

PERFORMANCE OF ROUNDUP PROMAX

Trial ID: 0854TG4 Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	TRIRE CONTROL PERCENT Jun-13-08 3 DA-A	OVERALL CONTROL PERCENT Jun-13-08 3 DA-A	OVERALL CONTROL PERCENT Jun-17-08 7 DA-A
01	ROUNDUP PROMAX	4.5	SL	5.44	QT/A	POST	26.3 a	61.3 a	81.3 a
02	ROUNDUP PROMAX	4.5	SL	2.72	QT/A	POST	20.0 b	61.3 a	72.5 b
03	ROUNDUP	4.0	SL	2.0	QT/A	POST	11.3 c	40.0 a	66.3 c
04	UNTREATED CHECK						0.0 d	0.0 b	0.0 d
	LSD (P=.05)						4.81	20.52	4.99
	Standard Deviation						3.00	12.83	3.12
	CV						20.9	31.58	5.67
	Bartlett's X2						1.139	12.648	2.209
	P(Bartlett's X2)						0.286	0.002*	0.331

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

PERFORMANCE OF ROUNDUP PROMAX

Trial ID: 0854TG4 Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	GRASS CONTROL PERCENT Jun-27-08 17 DA-A	TRIRE CONTROL PERCENT Jun-27-08 17 DA-A	OTHER WE CONTROL PERCENT Jun-27-08 17 DA-A
	Weed Code								
	Rating Data Type								
	Rating Unit								
	Rating Date								
	Trt-Eval Interval								
01	ROUNDUP PROMAX	4.5	SL	5.44	QT/A	POST	97.5 a	95.0 a	95.0 a
02	ROUNDUP PROMAX	4.5	SL	2.72	QT/A	POST	91.3 b	93.8 a	87.5 a
03	ROUNDUP	4.0	SL	2.0	QT/A	POST	88.8 b	92.5 a	86.3 a
04	UNTREATED CHECK						0.0 c	0.0 b	0.0 b
	LSD (P=.05)						4.00	6.83	9.63
	Standard Deviation						2.50	4.27	6.02
	CV						3.6	6.07	8.97
	Bartlett's X2						1.376	0.247	0.037
	P(Bartlett's X2)						0.503	0.884	0.981

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

MOSS CONTROL WITH VARIOUS PRODUCTS APPLIED BY A CO2 BACKPACK SPRAYER

Trial ID: 0855TG5 Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

GENERAL TRIAL INFORMATION

Study Director: Prof. Bhowmik **Title:** _____
Affiliation: _____ **Postal Code:** _____

Investigator: P. C. Bhowmik and D. Sarkar **Title:** _____
Affiliation: _____ **Postal Code:** _____

Trial Status: Completed **Initiation Date:** _____ **Country:** _____
City: _____ **State/Prov.:** _____ **Postal Code:** _____
Conducted Under GLP (Y/N): N **Conducted Under GEP (Y/N):** N

Objective: To compare the response of creeting bentgrass to various moss control products and to identify the extent of moss control.

Conclusions:

CROP AND PEST DESCRIPTION

Weed 1._____ _____ 2._____ _____

Crop 1:AGSPL _____ **Variety:** _____ **Planting Date:** _____
Planting Method: Established **Rate:** _____ _____ **Depth:** _____
Perennial Age: _____ **Row Spacing:** _____ **Seed Bed:** _____
Soil Temperature: _____ **Soil Moisture:** _____ **Emergence Date:** _____

Plot Width, Unit: 3.5 FT **Plot Length, Unit:** 7 FT **Reps:** 3
Site Type: _____
Tillage Type: _____ **Study Design:** RANDOMIZED COMPLETE BLOCK
Trial Initiation Comments: _____

Previous:	Crops	Pesticides	Year
1.			

MAINTENANCE

Field Prep./Maintenance: Half inch mowing height

No.	Date	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit
1.							

SOIL DESCRIPTION

Texture: _____ **% OM:** _____ **% Sand:** _____ **% Silt:** _____ **% Clay:** _____
pH: _____ **CEC:** _____ **Soil Name:** _____ **Fertility Level:** _____

MOISTURE CONDITIONS

On:	Date	Time	Amount	Unit	Type	Interval	Unit
1.							

Overall Moisture Conditions: _____
Closest Weather Station: _____ **Distance:** _____ **Unit:** _____

UNIVERSITY OF MASSACHUSETTS-AMHERST

APPLICATION DESCRIPTION

	A	B	C	D	E	F
Application Date:	Jul-02-08					
Time of Day:	AM					
Application Method:	SPRAY					
Application Timing:	POST					
Applic. Placement:						
Air Temp., Unit:	78.1 F					
% Relative Humidity:	52.3					
Wind Velocity, Unit:	0					
Dew Presence (Y/N):	_	_	_	_	_	_
Water Hardness:						
Soil Temp., Unit:	86 F	80.2 F				
Soil Moisture:	@ 0.5"	@ 2.0"				
% Cloud Cover:						

CROP STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Crop 1 AGSPL Stage:						
Stage Scale:						
Height, Unit:						

WEED STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Weed 1 _____ Stage:						
Stage Scale:						
Density, Unit:						

APPLICATION EQUIPMENT

	A	B	C	D	E	F
Appl. Equipment:	BACKPACK					
Operating Pressure:	22PSI					
Nozzle Type:	TEEJET					
Nozzle Size:	1104 VS					
Nozzle Spacing, Unit:	20 INCH					
Nozzles/Row:						
Band Width, Unit:						
Boom Length, Unit:						
Boom Height, Unit:	17 INCH					
Ground Speed, Unit:						
Incorporation Equip.:						
Hours to Incorp.:						
Incorp. Depth, Unit:						
Carrier:	WATER					
Spray Volume, Unit:	50 GPA					
Spray pH:						
Propellant:						
Tank Mix (Y/N):	_	_	_	_	_	_

Trt No	Treatment Application Comment
__	Each plot was sprayed twice at the rate of 50gpa to apply 100 gpa

UNIVERSITY OF MASSACHUSETTS-AMHERST

MOSS CONTROL WITH VARIOUS PRODUCTS APPLIED BY A CO2 BACKPACK SPRAYER

Trial ID: 0855TG5 Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	AGSPL PHYTO PERCENT Jul-04-08 2 DAA	AGSPL PHYTO PERCENT Jul-07-08 5 DAA	AGSPL PHYTO PERCENT Jul-10-08 8 DAA
01	UNTREATED CHECK						3.3 b	3.3 a	0.0 c
02	MOSS-1 (B)-Nut			32	FL OZ/1000 FT2	POST	6.7 b	5.0 a	3.3 c
03	MOSS-1 (A)			32	FL OZ/1000 FT2	POST	20.0 a	15.0 a	11.7 b
04	WORRY FREE MOSS			32	FL OZ/1000 FT2	POST	6.7 b	6.7 a	8.3 b
05	MOSS OUT			64	FL OZ/1000 FT2	POST	0.0 b	3.3 a	28.3 a
	LSD (P=.05)						9.09	9.57	4.38
	Standard Deviation						4.83	5.08	2.33
	CV						65.87	76.24	22.52
	Bartlett's X2						0.0	0.902	0.0
	P(Bartlett's X2)						0.001*	0.924	0.001*

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

MOSS CONTROL WITH VARIOUS PRODUCTS APPLIED BY A CO2 BACKPACK SPRAYER

Trial ID: 0855TG5 Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	AGSPL CONTROL PERCENT Jul-10-08 8 DAA	AGSPL PHYTO PERCENT Jul-25-08 3 WAA	AGSPL CONTROL PERCENT Jul-25-08 3 WAA
	Crop Code						AGSPL	AGSPL	AGSPL
	Rating Data Type						CONTROL	PHYTO	CONTROL
	Rating Unit						PERCENT	PERCENT	PERCENT
	Rating Date						Jul-10-08	Jul-25-08	Jul-25-08
	Trt-Eval Interval						8 DAA	3 WAA	3 WAA
01	UNTREATED CHECK						0.0 b	0.0 d	0.0 b
02	MOSS-1 (B)-Nut			32	FL OZ/1000 FT2	POST	0.0 b	3.3 cd	13.3 b
03	MOSS-1 (A)			32	FL OZ/1000 FT2	POST	0.0 b	10.0 b	20.0 b
04	WORRY FREE MOSS			32	FL OZ/1000 FT2	POST	0.0 b	6.7 bc	0.0 b
05	MOSS OUT			64	FL OZ/1000 FT2	POST	80.0 a	26.7 a	83.3 a
	LSD (P=.05)						0.00	4.55	31.79
	Standard Deviation						0.00	2.42	16.88
	CV						0.0	25.88	72.35
	Bartlett's X2						0.0	0.0	4.642
	P(Bartlett's X2)						0.00*	0.001*	0.098

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

MOSS CONTROL WITH VARIOUS PRODUCTS APPLIED BY A GARDEN HOSE SPRAYER

Trial ID: 0856TG6 Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

GENERAL TRIAL INFORMATION

Study Director: Prof. Bhowmik **Title:** _____
Affiliation: _____ **Postal Code:** _____

Investigator: P. C. Bhowmik and D. Sarkar **Title:** _____
Affiliation: _____ **Postal Code:** _____

Trial Status: _____ **Initiation Date:** _____ **Country:** _____
City: _____ **State/Prov.:** _____ **Postal Code:** _____
Conducted Under GLP (Y/N): N **Conducted Under GEP (Y/N):** N

Objective: To compare the response of turfgrass species to various moss control products and to identify the extent of moss control.

Conclusions:

CROP AND PEST DESCRIPTION

Weed 1._____ _____ 2._____ _____

Crop 1:AGSPL _____ **Variety:** _____ **Planting Date:** _____
Planting Method: Established **Rate:** _____ _____ **Depth:** ____ __
Perennial Age: ____ _____ **Row Spacing:** ____ _____ **Seed Bed:** _____
Soil Temperature: ____ _ **Soil Moisture:** _____ **Emergence Date:** _____

Plot Width, Unit: 3.5 FT **Plot Length, Unit:** 7 FT **Reps:** 3
Site Type: _____
Tillage Type: _____ **Study Design:** RANDOMIZED COMPLETE BLOCK
Trial Initiation Comments: _____
_____

Previous:	Crops	Pesticides	Year
1.	_____	_____	____

MAINTENANCE

Field Prep./Maintenance: Half inch mowing height

No.	Date	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit
1.	_____	_____	____	_____	___	_____	_____

SOIL DESCRIPTION

Texture: _____ **% OM:** ____ **% Sand:** ____ **% Silt:** ____ **% Clay:** ____
pH: ____ **CEC:** ____ **Soil Name:** _____ **Fertility Level:** _____

MOISTURE CONDITIONS

On:	Date	Time	Amount	Unit	Type	Interval	Unit
1.	_____	_____	_____	__	_____	_____	___

Overall Moisture Conditions: _____
Closest Weather Station: _____ **Distance:** _____ **Unit:** __

UNIVERSITY OF MASSACHUSETTS-AMHERST

APPLICATION DESCRIPTION

	A	B	C	D	E	F
Application Date:	Jul-02-08					
Time of Day:	AM					
Application Method:	SPRAY					
Application Timing:	POST					
Applic. Placement:						
Air Temp., Unit:	78.1 F					
% Relative Humidity:	52.3					
Wind Velocity, Unit:	0					
Dew Presence (Y/N):						
Water Hardness:						
Soil Temp., Unit:	86 F					
Soil Moisture:						
% Cloud Cover:						

CROP STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Crop 1 AGSPL Stage:						
Stage Scale:						
Height, Unit:						

WEED STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Weed 1 _____ Stage:						
Stage Scale:						
Density, Unit:						

APPLICATION EQUIPMENT

	A	B	C	D	E	F
Appl. Equipment:	GARDEN HO	GARDEN HO				
Operating Pressure:						
Nozzle Type:	Yellow	White				
Nozzle Size:						
Nozzle Spacing, Unit:						
Nozzles/Row:						
Band Width, Unit:						
Boom Length, Unit:						
Boom Height, Unit:						
Ground Speed, Unit:						
Incorporation Equip.:						
Hours to Incorp.:						
Incorp. Depth, Unit:						
Carrier:						
Spray Volume, Unit:						
Spray pH:						
Propellant:						
Tank Mix (Y/N):						

Trt No	Treatment Application Comment
__	Volume of application was described under the methods

UNIVERSITY OF MASSACHUSETTS-AMHERST

MOSS CONTROL WITH VARIOUS PRODUCTS APPLIED BY A GARDEN HOSE SPRAYER

Trial ID: 0856TG6 Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	AGSPL PHYTO PERCENT Jul-04-08 2 DAA	AGSPL PHYTO PERCENT Jul-07-08 5 DAA	AGSPL PHYTO PERCENT Jul-10-08 8 DAA
01	UNTREATED CHECK						0.0 a	0.0 b	0.0 a
02	MOSS-1 (B)-Nut			32	FL OZ/1000 FT2	POST	0.0 a	3.3 b	3.3 a
03	MOSS-1 (A)			32	FL OZ/1000 FT2	POST	0.0 a	5.0 b	6.7 a
04	WORRY FREE MOSS			32	FL OZ/1000 FT2	POST	0.0 a	18.3 a	11.7 a
05	MOSS OUT			64	FL OZ/1000 FT2	POST	0.0 a	3.3 b	1.7 a
	LSD (P=.05)						0.00	8.42	11.01
	Standard Deviation						0.00	4.47	5.85
	CV						0.0	74.54	125.25
	Bartlett's X2						0.0	0.0	4.056
	P(Bartlett's X2)						0.00*	1.00	0.256

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

MOSS CONTROL WITH VARIOUS PRODUCTS APPLIED BY A GARDEN HOSE SPRAYER

Trial ID: 0856TG6 Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	AGSPL CONTROL PERCENT Jul-10-08 8 DAA	AGSPL PHYTO PERCENT Jul-25-08 3 WAA	AGSPL CONTROL PERCENT Jul-25-08 3 WAA
	Crop Code								
	Rating Data Type								
	Rating Unit								
	Rating Date								
	Trt-Eval Interval								
01	UNTREATED CHECK						0.0 a	0.0 a	0.0 a
02	MOSS-1 (B)-Nut			32	FL OZ/1000 FT2	POST	0.0 a	6.7 a	0.0 a
03	MOSS-1 (A)			32	FL OZ/1000 FT2	POST	0.0 a	5.0 a	0.0 a
04	WORRY FREE MOSS			32	FL OZ/1000 FT2	POST	0.0 a	5.0 a	0.0 a
05	MOSS OUT			64	FL OZ/1000 FT2	POST	0.0 a	5.0 a	0.0 a
	LSD (P=.05)						0.00	14.02	0.00
	Standard Deviation						0.00	7.44	0.00
	CV						0.0	171.79	0.0
	Bartlett's X2						0.0	0.613	0.0
	P(Bartlett's X2)						0.00*	0.894	0.00*

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

COMPARATIVE PERFORMANCE OF TENACITY IN CONTROLLING CRABGRASS

Trial ID: 0857TG7 Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

GENERAL TRIAL INFORMATION

Study Director: Prof. Bhowmik **Title:** _____
Affiliation: _____ **Postal Code:** _____

Investigator: P. C. Bhowmik and D. Sarkar **Title:** _____
Affiliation: _____ **Postal Code:** _____

Trial Status: _____ **Initiation Date:** _____ **Country:** _____
City: _____ **State/Prov.:** _____ **Postal Code:** _____
Conducted Under GLP (Y/N): N **Conducted Under GEP (Y/N):** N

Objective:

Conclusions:

CROP AND PEST DESCRIPTION

Weed 1. _____ _____ 2. _____ _____

Crop 1: _____ _____ **Variety:** _____ **Planting Date:** _____
Planting Method: _____ **Rate:** _____ _____ **Depth:** _____ __
Perennial Age: _____ _____ **Row Spacing:** _____ _____ **Seed Bed:** _____
Soil Temperature: _____ _ **Soil Moisture:** _____ **Emergence Date:** _____

Plot Width, Unit: 3.5 FT **Plot Length, Unit:** 20 FT **Reps:** 1
Site Type: _____
Tillage Type: _____ **Study Design:** RANDOMIZED COMPLETE BLOCK
Trial Initiation Comments: _____

Previous:	Crops	Pesticides	Year
1.			

MAINTENANCE

Field Prep./Maintenance: _____

No.	Date	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit
1.							

SOIL DESCRIPTION

Texture: _____ **% OM:** _____ **% Sand:** _____ **% Silt:** _____ **% Clay:** _____
pH: _____ **CEC:** _____ **Soil Name:** _____ **Fertility Level:** _____

MOISTURE CONDITIONS

On:	Date	Time	Amount	Unit	Type	Interval	Unit
1.							

Overall Moisture Conditions: _____
Closest Weather Station: _____ **Distance:** _____ **Unit:** __

UNIVERSITY OF MASSACHUSETTS-AMHERST

APPLICATION DESCRIPTION

	A	B	C	D	E	F
Application Date:	May-05-08		Jun-10-08			
Time of Day:	PM		AM			
Application Method:	SPRAY		SPRAY			
Application Timing:	PRE		POST			
Applic. Placement:			88.7			
Air Temp., Unit:	72.8 F		88.7 F			
% Relative Humidity:	21		50.2			
Wind Velocity, Unit:	5		5			
Dew Presence (Y/N):						
Water Hardness:						
Soil Temp., Unit:	66.3 F	60.8 F	80.6 F	77.0 F		
Soil Moisture:	@ 0.5"	@ 2.00"	@ 0.5"	@ 2.00"		
% Cloud Cover:						

CROP STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Crop 1 _____ Stage:						
Stage Scale:						
Height, Unit:						

WEED STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Weed 1 _____ Stage:						
Stage Scale:						
Density, Unit:						

APPLICATION EQUIPMENT

	A	B	C	D	E	F
Appl. Equipment:	BACKPACK					
Operating Pressure:	22PSI					
Nozzle Type:	TEEJET					
Nozzle Size:	1104 VS					
Nozzle Spacing, Unit:	20 INCH					
Nozzles/Row:						
Band Width, Unit:						
Boom Length, Unit:						
Boom Height, Unit:	17 INCH					
Ground Speed, Unit:						
Incorporation Equip.:						
Hours to Incorp.:						
Incorp. Depth, Unit:						
Carrier:	WATER					
Spray Volume, Unit:	50 GPA					
Spray pH:						
Propellant:						
Tank Mix (Y/N):						

Trt No	Treatment Application Comment

UNIVERSITY OF MASSACHUSETTS-AMHERST

COMPARATIVE PERFORMANCE OF TENACITY IN CONTROLLING CRABGRASS

Trial ID: 0857TG7 Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	OVERALL CONTROL PERCENT Jun-27-08 17 DA-A	DIGSA CONTROL PERCENT Jun-27-08 17 DA-A	TRIRE CONTROL PERCENT Jun-27-08 17 DA-A	OTHER CONTROL PERCENT Jun-27-08 17 DA-A
	Weed Code									
	Rating Data Type									
	Rating Unit									
	Rating Date									
	Trt-Eval Interval									
01	EXC 892	0.20	G	173	LB/A	PRE	85.0	85.0	90.0	30.0
02	AE 747	630	SC	3	OZ/A	PRE	50.0	80.0	40.0	20.0
03	RONSTAR	2	G	2	LB A/A	PRE	70.0	80.0	60.0	30.0
04	DRIVE XLR8		L	1.5	FL OZ/1000 FT2	POST	90.0	95.0	90.0	80.0
	NIS (X-77)			0.25	% V/V	POST				
05	TENACITY	4	L	4	FL OZ/1000 FT2	POST	95.0	99.0	99.0	95.0
	NIS (X-77)			0.25	% V/V	POST				
	LSD (P=.05)						.	.	.	.
	Standard Deviation						.	.	.	.
	CV						.	.	.	.
	Bartlett's X2						.	.	.	.
	P(Bartlett's X2)						.	.	.	.

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

COMPARATIVE PERFORMANCE OF TENACITY IN CONTROLLING CRABGRASS

Trial ID: 0857TG7 Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	DIGSA CONTROL PERCENT Jul-07-08 27 DA-A	OVERALL CONTROL PERCENT Jul-27-08 47 DA-A	DIGSA CONTROL PERCENT Jun-27-08 17 DA-A	TRIRE CONTROL PERCENT Jun-27-08 17 DA-A
	Weed Code									
	Rating Data Type									
	Rating Unit									
	Rating Date									
	Trt-Eval Interval									
01	EXC 892	0.20	G	173	LB/A	PRE	85.0	10.0	10.0	30.0
02	AE 747	630	SC	3	OZ/A	PRE	60.0	0.0	0.0	0.0
03	RONSTAR	2	G	2	LB A/A	PRE	75.0	10.0	30.0	0.0
04	DRIVE XLR8		L	1.5	FL OZ/1000 FT2	POST	95.0	70.0	80.0	30.0
	NIS (X-77)			0.25	% V/V	POST				
05	TENACITY	4	L	4	FL OZ/1000 FT2	POST	100.0	90.0	90.0	90.0
	NIS (X-77)			0.25	% V/V	POST				
	LSD (P=.05)						.	.	.	.
	Standard Deviation						.	.	.	.
	CV						.	.	.	.
	Bartlett's X2						.	.	.	.
	P(Bartlett's X2)						.	.	.	.

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

TOLERANCE OF CREEPING BENTGRASS TO EXC 4142

Trial ID: 0859TG9 Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

GENERAL TRIAL INFORMATION

Study Director: Prof. Bhowmik **Title:** _____
Affiliation: _____ **Postal Code:** _____

Investigator: P. C. Bhowmik, D. Sarkar, D. Lycan and M. Agnew
Affiliation: _____ **Postal Code:** _____

Trial Status: Completed **Initiation Date:** _____ **Country:** _____
City: _____ **State/Prov.:** _____ **Postal Code:** _____
Conducted Under GLP (Y/N): N **Conducted Under GEP (Y/N):** N

Objective: To identify extent of bentgrass safety to EXC 4142

Conclusions:

CROP AND PEST DESCRIPTION

Weed 1._____ _____ 2._____ _____

Crop 1:AGRPL _____ **Variety:** _____ **Planting Date:** _____
Planting Method: Established turfgrass **Rate:** _____ _____ **Depth:** _____
Perennial Age: 3 Year **Row Spacing:** _____ _____ **Seed Bed:** _____
Soil Temperature: _____ **Soil Moisture:** _____ **Emergence Date:** _____

Plot Width, Unit: 3.5 FT **Plot Length, Unit:** 10 FT **Reps:** 4
Site Type: _____
Tillage Type: _____ **Study Design:** RANDOMIZED COMPLETE BLOCK
Trial Initiation Comments: Established creeping bentgrass, maintained at 0.5 inch cutting height

Previous:	Crops	Pesticides	Year
1.			

SOIL DESCRIPTION

Texture: _____ **% OM:** _____ **% Sand:** _____ **% Silt:** _____ **% Clay:** _____
pH: _____ **CEC:** _____ **Soil Name:** _____ **Fertility Level:** _____

MOISTURE CONDITIONS

On:	Date	Time	Amount	Unit	Type	Interval	Unit
1.							

Overall Moisture Conditions: _____
Closest Weather Station: _____ **Distance:** _____ **Unit:** _____

UNIVERSITY OF MASSACHUSETTS-AMHERST

APPLICATION DESCRIPTION

	A	B	C	D	E	F
Application Date:	Jun-20-08		Jul-22-08			
Time of Day:	AM		AM			
Application Method:	SPRAY		SPRAY			
Application Timing:	POST		POST			
Applic. Placement:						
Air Temp., Unit:	69 F		74.4 F			
% Relative Humidity:	43.2		51.8			
Wind Velocity, Unit:	0		5 MPH			
Dew Presence (Y/N):						
Water Hardness:						
Soil Temp., Unit:	73.7 F	70 F	78.8 F	77.9 F		
Soil Moisture:	@ 0.5"	@ 2.00"	@ 0.5"	@ 2.00"		
% Cloud Cover:	50		70			

CROP STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Crop 1 AGRPL Stage:						
Stage Scale:						
Height, Unit:						

WEED STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Weed 1 _____ Stage:						
Stage Scale:						
Density, Unit:						

APPLICATION EQUIPMENT

	A	B	C	D	E	F
Appl. Equipment:	BACKPACK					
Operating Pressure:	22PSI					
Nozzle Type:	TEEJET					
Nozzle Size:	1104 VS					
Nozzle Spacing, Unit:	20 INCH					
Nozzles/Row:						
Band Width, Unit:						
Boom Length, Unit:						
Boom Height, Unit:	17 INCH					
Ground Speed, Unit:						
Incorporation Equip.:						
Hours to Incorp.:						
Incorp. Depth, Unit:						
Carrier:	WATER					
Spray Volume, Unit:	50 GPA					
Spray pH:						
Propellant:						
Tank Mix (Y/N):						

Trt No	Treatment Application Comment

UNIVERSITY OF MASSACHUSETTS-AMHERST

TOLERANCE OF CREEPING BENTGRASS TO EXC 4142

Trial ID: 0859TG9 Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	AGRPA PHYTO PERCENT Jun-23-08 3 DA-A	AGRPA PHYTO PERCENT Jun-27-08 7 DA-A	AGRPA PHYTO PERCENT Jul-02-08 12 DA-A	AGRPA PHYTO PERCENT Jul-25-08 35 DA-A
01	UNTREATED CONTROL						0.0 a	0.0 a	0.0 a	0.0 a
02	EXC 4142	75	DG	50	G A/A	POST	0.5 a	0.0 a	0.0 a	0.0 a
	EZA 10347			0.25	% V/V	POST				
03	EXC 4142	75	DG	100	G A/A	POST	2.0 a	1.0 a	0.0 a	0.0 a
	EZA 10347			0.25	% V/V	POST				
04	EXC 4142	75	DG	150	G A/A	POST	1.0 a	0.0 a	0.0 a	0.0 a
	EZA 10347			0.25	% V/V	POST				
05	EXC 4142	75	DG	300	G A/A	POST	2.3 a	1.0 a	0.0 a	0.0 a
	EZA 10347			0.25	% V/V	POST				
06	SEDGEHAMER	75	DG	70	G A/A	POST	0.5 a	0.5 a	0.0 a	0.0 a
	EZA 10347			0.25	% V/V	POST				
07	EXC 4142	75	DG	50	G A/A	POST	0.5 a	0.0 a	0.0 a	0.0 a
	EZA 10347			0.25	% V/V	POST				
	EXC 4142	75	DG	50	G A/A	4WKA				
	EZA 10347			0.25	% V/V	4WKA				
08	EXC 4142	75	DG	100	G A/A	POST	1.0 a	0.0 a	0.0 a	0.0 a
	EZA 10347			0.25	% V/V	POST				
	EXC 4142	75	DG	100	G A/A	4WKA				
	EZA 10347			0.25	% V/V	4WKA				
09	EXC 4142	75	DG	150	G A/A	POST	0.5 a	0.0 a	0.0 a	0.0 a
	EZA 10347			0.25	% V/V	POST				
	EXC 4142	75	DG	150	G A/A	4WKA				
	EZA 10347			0.25	% V/V	4WKA				
10	EXC 4142	75	DG	300	G A/A	POST	2.3 a	1.0 a	0.0 a	0.0 a
	EZA 10347			0.25	% V/V	POST				
	EXC 4142	75	DG	300	G A/A	4WKA				
	EZA 10347			0.25	% V/V	4WKA				
11	SEDGEHAMER	70	DG	70	G A/A	POST	0.5 a	0.0 a	0.0 a	0.0 a
	EZA 10347			0.25	% V/V	POST				
	SEDGEHAMER	70	DG	70	G A/A	4WKA				
	EZA 10347			0.25	% V/V	4WKA				
LSD (P=.05)							1.80	1.01	0.00	0.00
Standard Deviation							1.25	0.70	0.00	0.00
CV							124.98	220.2	0.0	0.0
Bartlett's X2							4.962	0.085	0.0	0.0
P(Bartlett's X2)							0.762	0.994	0.00*	0.00*

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

TOLERANCE OF CREEPING BENTGRASS TO EXC 4142

Trial ID: 0859TG9 Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	AGRPA PHYTO PERCENT Aug-01-08 42 DA-A	AGRPA PHYTO PERCENT Aug-22-08	AGRPA PHYTO PERCENT Sep-12-08	AGRPA PHYTO PERCENT Sep-26-08
01	UNTREATED CONTROL						0.0 a	0.0 a	0.0 a	0.0 a
02	EXC 4142	75	DG	50	G A/A POST		0.0 a	0.0 a	0.0 a	0.0 a
	EZA 10347			0.25	% V/V POST					
03	EXC 4142	75	DG	100	G A/A POST		0.0 a	0.0 a	0.0 a	0.0 a
	EZA 10347			0.25	% V/V POST					
04	EXC 4142	75	DG	150	G A/A POST		0.0 a	0.0 a	0.0 a	0.0 a
	EZA 10347			0.25	% V/V POST					
05	EXC 4142	75	DG	300	G A/A POST		0.0 a	0.0 a	0.0 a	0.0 a
	EZA 10347			0.25	% V/V POST					
06	SEDGEHAMER	75	DG	70	G A/A POST		0.0 a	0.0 a	0.0 a	0.0 a
	EZA 10347			0.25	% V/V POST					
07	EXC 4142	75	DG	50	G A/A POST		0.0 a	0.0 a	0.0 a	0.0 a
	EZA 10347			0.25	% V/V POST					
	EXC 4142	75	DG	50	G A/A 4WKA					
	EZA 10347			0.25	% V/V 4WKA					
08	EXC 4142	75	DG	100	G A/A POST		0.0 a	0.0 a	0.0 a	0.0 a
	EZA 10347			0.25	% V/V POST					
	EXC 4142	75	DG	100	G A/A 4WKA					
	EZA 10347			0.25	% V/V 4WKA					
09	EXC 4142	75	DG	150	G A/A POST		0.0 a	0.0 a	0.0 a	0.0 a
	EZA 10347			0.25	% V/V POST					
	EXC 4142	75	DG	150	G A/A 4WKA					
	EZA 10347			0.25	% V/V 4WKA					
10	EXC 4142	75	DG	300	G A/A POST		0.0 a	0.0 a	0.0 a	0.0 a
	EZA 10347			0.25	% V/V POST					
	EXC 4142	75	DG	300	G A/A 4WKA					
	EZA 10347			0.25	% V/V 4WKA					
11	SEDGEHAMER	70	DG	70	G A/A POST		0.0 a	0.0 a	0.0 a	0.0 a
	EZA 10347			0.25	% V/V POST					
	SEDGEHAMER	70	DG	70	G A/A 4WKA					
	EZA 10347			0.25	% V/V 4WKA					
LSD (P=.05)							0.00	0.00	0.00	0.00
Standard Deviation							0.00	0.00	0.00	0.00
CV							0.0	0.0	0.0	0.0
Bartlett's X2							0.0	0.0	0.0	0.0
P(Bartlett's X2)							0.00*	0.00*	0.00*	0.00*

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

PERFORMANCE OF PROSHOT IN CRABGRASS CONTROL IN TURFGRASS

Trial ID: 0861TG11 Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

GENERAL TRIAL INFORMATION

Study Director: Prof. Bhowmik **Title:** _____
Affiliation: _____ **Postal Code:** _____

Investigator: P. C. Bhowmik and S. J. Koo **Title:** _____
Affiliation: _____ **Postal Code:** _____

Trial Status: _____ **Initiation Date:** _____ **Country:** _____
City: _____ **State/Prov.:** _____ **Postal Code:** _____
Conducted Under GLP (Y/N): N **Conducted Under GEP (Y/N):** N

Objective:

Conclusions:

CROP AND PEST DESCRIPTION

Weed 1. DIGSA _____ 2. _____

Crop 1: LOLPE _____ **Variety:** _____ **Planting Date:** _____
Planting Method: _____ **Rate:** _____ _____ **Depth:** _____
Perennial Age: 3 year **Row Spacing:** _____ _____ **Seed Bed:** _____
Soil Temperature: _____ **Soil Moisture:** _____ **Emergence Date:** _____

Plot Width, Unit: 3.5 FT **Plot Length, Unit:** 10 FT **Reps:** 3
Site Type: _____
Tillage Type: _____ **Study Design:** RANDOMIZED COMPLETE BLOCK
Trial Initiation Comments: _____

Previous:	Crops	Pesticides	Year
1.	_____	_____	_____

MAINTENANCE

Field Prep./Maintenance: Low maintenance - Perennial ryegrass

No.	Date	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit
1.	_____	_____	_____	_____	_____	_____	_____

SOIL DESCRIPTION

Texture: _____ **% OM:** _____ **% Sand:** _____ **% Silt:** _____ **% Clay:** _____
pH: _____ **CEC:** _____ **Soil Name:** _____ **Fertility Level:** _____

MOISTURE CONDITIONS

On:	Date	Time	Amount	Unit	Type	Interval	Unit
1.	_____	_____	_____	_____	_____	_____	_____

Overall Moisture Conditions: _____
Closest Weather Station: _____ **Distance:** _____ **Unit:** _____

UNIVERSITY OF MASSACHUSETTS-AMHERST

APPLICATION DESCRIPTION

	A	B	C	D	E	F
Application Date:	Jun-10-08					
Time of Day:	AM					
Application Method:	SPRAY					
Application Timing:	POST					
Applic. Placement:						
Air Temp., Unit:	88.7 F					
% Relative Humidity:	50.2					
Wind Velocity, Unit:	0					
Dew Presence (Y/N):						
Water Hardness:						
Soil Temp., Unit:	80.6 F	77.0 F				
Soil Moisture:						
% Cloud Cover:						

CROP STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Crop 1 LOLPE Stage:						
Stage Scale:						
Height, Unit:						

WEED STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Weed 1 DIGSA Stage:	1-3L					
Stage Scale:						
Density, Unit:						

APPLICATION EQUIPMENT

	A	B	C	D	E	F
Appl. Equipment:	BACKPACK					
Operating Pressure:	22PSI					
Nozzle Type:	TEEJET					
Nozzle Size:	1104 VS					
Nozzle Spacing, Unit:	20 INCH					
Nozzles/Row:						
Band Width, Unit:						
Boom Length, Unit:						
Boom Height, Unit:	17 INCH					
Ground Speed, Unit:						
Incorporation Equip.:						
Hours to Incorp.:						
Incorp. Depth, Unit:						
Carrier:	WATER					
Spray Volume, Unit:	50 GPA					
Spray pH:						
Propellant:						
Tank Mix (Y/N):						

Trt No	Treatment Application Comment
	Postemergence application

UNIVERSITY OF MASSACHUSETTS-AMHERST

PERFORMANCE OF METHIOZOLIN IN CRABGRASS CONTROL

Trial ID: 0861TG11 Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	DIGSA CONTROL PERCENT Jun-13-08 3 DA-A	DIGSA CONTROL PERCENT Jun-17-08 7 DA-A	DIGSA CONTROL PERCENT Jun-26-08 16 DA-A	OTHER CONTROL PERCENT Jun-13-08 3 DA-A
01	UNTREATED CHECK						0.0 a	5.0 c	0.0 c	0.0 b
02	PROSHOT	25	EC	250	G A/A	POST	18.3 a	21.7 bc	26.7 bc	31.7 ab
03	PROSHOT ACTIVATOR 90	25	EC	250 0.25	G A/A % V/V	POST POST	6.7 a	6.7 c	30.0 bc	23.3 ab
04	PROSHOT	25	EC	500	G A/A	POST	30.0 a	23.3 bc	36.7 bc	20.0 ab
05	PROSHOT ACTIVATOR 90	25	EC	500 0.25	G A/A % V/V	POST POST	0.0 a	8.3 c	20.0 bc	23.3 ab
06	PROSHOT	25	EC	750	G A/A	POST	8.3 a	30.0 bc	23.3 bc	26.7 ab
07	PROSHOT ACTIVATOR 90	25	EC	750 0.25	G A/A % V/V	POST POST	0.0 a	15.0 c	65.0 ab	60.0 ab
08	DRIVE XLR8 ACTIVATOR 90	180	L	1.5 0.25	FL OZ/1000 FT2 % V/V	POST POST	41.7 a	96.0 a	86.7 a	80.0 a
09	TENACITY ACTIVATOR 90	4	L	5.0 0.25	OZ/A % V/V	POST POST	0.0 a	68.3 ab	60.0 ab	56.7 ab
	LSD (P=.05)						32.89	36.34	35.02	39.67
	Standard Deviation						19.00	20.99	20.23	22.92
	CV						162.88	68.87	52.27	64.12
	Bartlett's X2						3.073	16.404	3.707	10.387
	P(Bartlett's X2)						0.546	0.037*	0.813	0.109

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

PERFORMANCE OF METHIOZOLIN IN CRABGRASS CONTROL

Trial ID: 0861TG11 Study Dir.: Prof. Bhowmik
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	DIGSA CONTROL PERCENT Jul-08-08 28 DA-A	DIGSA CONTROL PERCENT Jul-18-08 38 DA-A	OTHER CONTROL PERCENT Jul-18-08 38 DA-A	DIGSA COVER PERCENT Aug-01-08 52 DA-A
01	UNTREATED CHECK						0.0 b	0.0 b	0.0 b	100.0 a
02	PROSHOT	25	EC	250	G A/A	POST	15.0 b	6.7 b	3.3 b	95.0 a
03	PROSHOT ACTIVATOR 90	25	EC	250 0.25	G A/A % V/V	POST POST	8.3 b	3.3 b	0.0 b	98.3 a
04	PROSHOT	25	EC	500	G A/A	POST	28.3 b	0.0 b	0.0 b	96.7 a
05	PROSHOT ACTIVATOR 90	25	EC	500 0.25	G A/A % V/V	POST POST	10.0 b	0.0 b	0.0 b	100.0 a
06	PROSHOT	25	EC	750	G A/A	POST	6.7 b	0.0 b	0.0 b	100.0 a
07	PROSHOT ACTIVATOR 90	25	EC	750 0.25	G A/A % V/V	POST POST	18.3 b	3.3 b	3.3 b	95.0 a
08	DRIVE XLR8 ACTIVATOR 90	180	L	1.5 0.25	FL OZ/1000 FT2 % V/V	POST POST	97.0 a	66.7 a	23.3 a	50.0 b
09	TENACITY ACTIVATOR 90	4	L	5.0 0.25	OZ/A % V/V	POST POST	43.3 b	23.3 b	3.3 b	93.3 a
	LSD (P=.05)						28.79	25.94	6.97	10.48
	Standard Deviation						16.63	14.98	4.03	6.06
	CV						65.95	130.51	108.69	6.58
	Bartlett's X2						18.755	9.853	0.0	5.949
	P(Bartlett's X2)						0.009*	0.043*	1.00	0.311

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

MOSS CONTROL WITH VARIOUS PRODUCTS APPLIED BY A CO2 BACKPACK SPRAYER

Trial ID: 0862TG12 Study Dir.: Prof. Bhowmik
Location: Home Garden Investigator: PRASANTA C. BHOWMIK

GENERAL TRIAL INFORMATION

Study Director: Prof. Bhowmik **Title:** _____
Affiliation: _____ **Postal Code:** _____

Investigator: P. C. Bhowmik and D. Sarkar **Title:** _____
Affiliation: _____ **Postal Code:** _____

Trial Status: Completed **Initiation Date:** _____ **Country:** _____
City: _____ **State/Prov.:** _____ **Postal Code:** _____
Conducted Under GLP (Y/N): N **Conducted Under GEP (Y/N):** N

Objective: To compare the efficay and safety of various moss control products.

Conclusions:

CROP AND PEST DESCRIPTION

Weed 1.Moss _____ 2._____ _____

Crop 1:_____ _____ **Variety:** _____ **Planting Date:** _____
Planting Method: _____ **Rate:** _____ _____ **Depth:** _____ __
Perennial Age: _____ _____ **Row Spacing:** _____ _____ **Seed Bed:** _____
Soil Temperature: _____ _ **Soil Moisture:** _____ **Emergence Date:** _____

Plot Width, Unit: 3.5 FT **Plot Length, Unit:** 5 FT **Reps:** 3
Site Type: _____
Tillage Type: _____ **Study Design:** RANDOMIZED COMPLETE BLOCK
Trial Initiation Comments: _____
_____

Previous:	Crops	Pesticides	Year
1.	_____	_____	____

MAINTENANCE

Field Prep./Maintenance: Low maintenance

No.	Date	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit
1.	_____	_____	____	_____	___	_____	_____

SOIL DESCRIPTION

Texture: _____ **% OM:** ____ **% Sand:** ____ **% Silt:** ____ **% Clay:** ____
pH: ____ **CEC:** ____ **Soil Name:** _____ **Fertility Level:** _____

MOISTURE CONDITIONS

On:	Date	Time	Amount	Unit	Type	Interval	Unit
1.	_____	_____	_____	__	_____	_____	___

Overall Moisture Conditions: _____
Closest Weather Station: _____ **Distance:** _____ **Unit:** __

UNIVERSITY OF MASSACHUSETTS-AMHERST

APPLICATION DESCRIPTION

	A	B	C	D	E	F
Application Date:	Jul-02-08					
Time of Day:	NOON					
Application Method:	SPRAY					
Application Timing:	POST					
Applic. Placement:						
Air Temp., Unit:	82.4 F					
% Relative Humidity:	52.2					
Wind Velocity, Unit:	0					
Dew Presence (Y/N):	_	_	_	_	_	_
Water Hardness:						
Soil Temp., Unit:	77.5 F	76.2 F				
Soil Moisture:	@ 0.5"	@ 2.0"				
% Cloud Cover:	5					

CROP STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Crop 1 _____ Stage:						
Stage Scale:						
Height, Unit:						

WEED STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Weed 1 Moss Stage:						
Stage Scale:						
Density, Unit:						

APPLICATION EQUIPMENT

	A	B	C	D	E	F
Appl. Equipment:	BACKPACK					
Operating Pressure:	22PSI					
Nozzle Type:	TEEJET					
Nozzle Size:	1104 VS					
Nozzle Spacing, Unit:	20 INCH					
Nozzles/Row:						
Band Width, Unit:						
Boom Length, Unit:						
Boom Height, Unit:	17 INCH					
Ground Speed, Unit:						
Incorporation Equip.:						
Hours to Incorp.:						
Incorp. Depth, Unit:						
Carrier:	WATER					
Spray Volume, Unit:	50 GPA					
Spray pH:						
Propellant:						
Tank Mix (Y/N):	_	_	_	_	_	_

Trt No	Treatment Application Comment
__	Each plot was sprayed twice to apply 100 gpa.

UNIVERSITY OF MASSACHUSETTS-AMHERST

MOSS CONTROL WITH VARIOUS PRODUCTS APPLIED BY A CO2 BACKPACK SPRAYER

Trial ID: 0862TG12 Study Dir.: Prof. Bhowmik
Location: Home Garden Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	AGSPL PHYTO PERCENT Jul-04-08 2 DAA	CONTROL PERCENT Jul-04-08 2 DAA	AGSPL PHYTO PERCENT Jul-07-08 5 DAA	CONTROL PERCENT Jul-07-08 5 DAA
	Crop Code									
	Rating Data Type									
	Rating Unit									
	Rating Date									
	Trt-Eval Interval									
01	UNTREATED CHECK						0.0 a	0.0 d	0.0 a	0.0 c
02	MOSS-1 (B)-Nut			32	FL OZ/1000 FT2	POST	0.0 a	18.3 c	0.0 a	13.3 c
03	MOSS-1 (A)			32	FL OZ/1000 FT2	POST	0.0 a	63.3 b	0.0 a	78.3 a
04	WORRY FREE MOSS			32	FL OZ/1000 FT2	POST	0.0 a	25.0 c	0.0 a	30.0 b
05	MOSS OUT			64	FL OZ/1000 FT2	POST	0.0 a	80.0 a	0.0 a	90.0 a
	LSD (P=.05)						0.00	15.47	0.00	13.80
	Standard Deviation						0.00	8.22	0.00	7.33
	CV						0.0	22.01	0.0	17.32
	Bartlett's X2						0.0	0.306	0.0	1.927
	P(Bartlett's X2)						0.00*	0.858	0.00*	0.382

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

MOSS CONTROL WITH VARIOUS PRODUCTS APPLIED BY A CO2 BACKPACK SPRAYER

Trial ID: 0862TG12 Study Dir.: Prof. Bhowmik
Location: Home Garden Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	AGSPL PHYTO PERCENT Jul-09-08 7 DAA	CONTROL PERCENT Jul-09-08 7 DAA	AGSPL PHYTO PERCENT Jul-18-08 16 DAA	CONTROL PERCENT Jul-18-08 16 DA-A
01	UNTREATED CHECK						0.0 a	0.0 c	0.0 a	0.0 c
02	MOSS-1 (B)-Nut			32	FL OZ/1000 FT2	POST	0.0 a	15.0 c	0.0 a	15.0 bc
03	MOSS-1 (A)			32	FL OZ/1000 FT2	POST	11.7 a	88.3 a	5.0 a	86.7 a
04	WORRY FREE MOSS			32	FL OZ/1000 FT2	POST	3.3 a	38.3 b	0.0 a	38.3 b
05	MOSS OUT			64	FL OZ/1000 FT2	POST	8.3 a	96.7 a	0.0 a	90.0 a
	LSD (P=.05)						12.92	18.31	4.21	30.60
	Standard Deviation						6.86	9.73	2.24	16.25
	CV						147.04	20.4	223.61	35.33
	Bartlett's X2						1.372	6.997	0.0	4.18
	P(Bartlett's X2)						0.504	0.072	0.00*	0.124

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

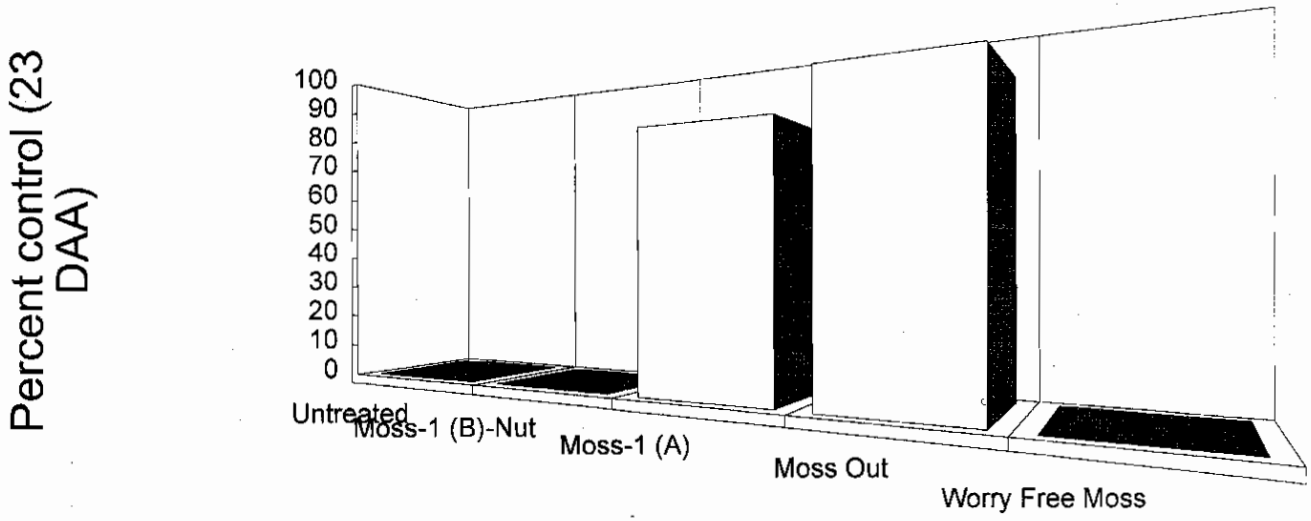
MOSS CONTROL WITH VARIOUS PRODUCTS APPLIED BY A CO2 BACKPACK SPRAYER

Trial ID: 0862TG12 Study Dir.: Prof. Bhowmik
Location: Home Garden Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	AGSPL PHYTO PERCENT Jul-25-08 23 DA-A	CONTROL PERCENT Jul-25-08 23 DA-A	AGSPL PHYTO PERCENT Aug-01-08 30 DA-A	CONTROL PERCENT Aug-01-08 30 DA-A
01	UNTREATED CHECK						0.0 a	0.0 c	0.0 a	0.0 c
02	MOSS-1 (B)-Nut			32	FL OZ/1000 FT2	POST	0.0 a	0.0 c	0.0 a	3.3 c
03	MOSS-1 (A)			32	FL OZ/1000 FT2	POST	0.0 a	76.7 b	0.0 a	51.7 b
04	WORRY FREE MOSS			32	FL OZ/1000 FT2	POST	0.0 a	0.0 c	0.0 a	6.7 c
05	MOSS OUT			64	FL OZ/1000 FT2	POST	0.0 a	88.3 a	0.0 a	88.3 a
	LSD (P=.05)						0.00	10.38	0.00	27.42
	Standard Deviation						0.00	5.52	0.00	14.56
	CV						0.0	16.71	0.0	48.54
	Bartlett's X2						0.0	3.163	0.0	8.54
	P(Bartlett's X2)						0.00*	0.075	0.00*	0.036*

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

Moss control with various products applied by a CO2 backpack sprayer



Trial ID: 0862TG12

UNIVERSITY OF MASSACHUSETTS-AMHERST

MOSS CONTROL WITH VARIOUS PRODUCTS APPLIED BY A GARDEN HOSE SPRAYER

Trial ID: 0863TG13 Study Dir.: Prof. Bhowmik
Location: Home Garden Investigator: PRASANTA C. BHOWMIK

GENERAL TRIAL INFORMATION

Study Director: Prof. Bhowmik **Title:** _____
Affiliation: _____ **Postal Code:** _____

Investigator: P. C. Bhowmik and D. Sarkar **Title:** _____
Affiliation: _____ **Postal Code:** _____

Trial Status: Completed **Initiation Date:** _____ **Country:** _____
City: _____ **State/Prov.:** _____ **Postal Code:** _____
Conducted Under GLP (Y/N): N **Conducted Under GEP (Y/N):** N

Objective: To compare the efficicacy and safety of various moss control products.

Conclusions:

CROP AND PEST DESCRIPTION

Weed 1.Moss _____ 2._____ _____

Crop 1:_____ _____ **Variety:** _____ **Planting Date:** _____
Planting Method: _____ **Rate:** _____ _____ **Depth:** ____ __
Perennial Age: ____ _____ **Row Spacing:** ____ _____ **Seed Bed:** _____
Soil Temperature: ____ _ **Soil Moisture:** _____ **Emergence Date:** _____

Plot Width, Unit: 3.5 FT **Plot Length, Unit:** 5 FT **Reps:** 3
Site Type: _____
Tillage Type: _____ **Study Design:** RANDOMIZED COMPLETE BLOCK
Trial Initiation Comments: _____
_____

Previous:	Crops	Pesticides	Year
1.	_____	_____	____

MAINTENANCE

Field Prep./Maintenance: Low maintenance

No.	Date	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit
1.	_____	_____	____	_____	___	_____	_____

SOIL DESCRIPTION

Texture: _____ **% OM:** ____ **% Sand:** ____ **% Silt:** ____ **% Clay:** ____
pH: ____ **CEC:** ____ **Soil Name:** _____ **Fertility Level:** _____

MOISTURE CONDITIONS

On:	Date	Time	Amount	Unit	Type	Interval	Unit
1.	_____	_____	_____	__	_____	_____	___

Overall Moisture Conditions: _____
Closest Weather Station: _____ **Distance:** _____ **Unit:** __

UNIVERSITY OF MASSACHUSETTS-AMHERST

APPLICATION DESCRIPTION

	A	B	C	D	E	F
Application Date:	Jul-02-08					
Time of Day:	PM					
Application Method:	SPRAY					
Application Timing:	POST					
Applic. Placement:						
Air Temp., Unit:	82.4 F					
% Relative Humidity:	52.2					
Wind Velocity, Unit:	0					
Dew Presence (Y/N):						
Water Hardness:						
Soil Temp., Unit:	77.5 F	76.2 F				
Soil Moisture:						
% Cloud Cover:	5					

CROP STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Crop 1 _____ Stage:						
Stage Scale:						
Height, Unit:						

WEED STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Weed 1 Moss Stage:						
Stage Scale:						
Density, Unit:						

APPLICATION EQUIPMENT

	A	B	C	D	E	F
Appl. Equipment:	Gard Hose	Gard Hose				
Operating Pressure:						
Nozzle Type:	Yellow	White				
Nozzle Size:						
Nozzle Spacing, Unit:						
Nozzles/Row:						
Band Width, Unit:						
Boom Length, Unit:						
Boom Height, Unit:						
Ground Speed, Unit:						
Incorporation Equip.:						
Hours to Incorp.:						
Incorp. Depth, Unit:						
Carrier:						
Spray Volume, Unit:						
Spray pH:						
Propellant:						
Tank Mix (Y/N):						

Trt No	Treatment Application Comment
__	Volume of application was described under the methods.

UNIVERSITY OF MASSACHUSETTS-AMHERST

MOSS CONTROL WITH VARIOUS PRODUCTS APPLIED BY A GARDEN HOSE SPRAYER

Trial ID: 0863TG13 Study Dir.: Prof. Bhowmik
Location: Home Garden Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	AGSPL PHYTO PERCENT Jul-04-08 2 DA-A	MOSS CONTROL PERCENT Jul-04-08 2 DA-A	AGSPL PHYTO PERCENT Jul-07-08 5 DA-A	MOSS CONTROL PERCENT Jul-07-08 5 DA-A
01	UNTREATED CHECK						0.0 a	0.0 a	0.0 b	0.0 a
02	MOSS-1 (B)-Nut			32	FL OZ/1000 FT2	POST	0.0 a	0.0 a	0.0 b	3.3 a
03	MOSS-1 (A)			32	FL OZ/1000 FT2	POST	0.0 a	0.0 a	16.7 a	36.7 a
04	WORRY FREE MOSS			32	FL OZ/1000 FT2	POST	0.0 a	0.0 a	1.7 b	33.3 a
05	MOSS OUT			64	FL OZ/1000 FT2	POST	0.0 a	0.0 a	0.0 b	23.3 a
	LSD (P=.05)						0.00	0.00	3.65	27.55
	Standard Deviation						0.00	0.00	1.94	14.63
	CV						0.0	0.0	52.81	75.7
	Bartlett's X2						0.0	0.0	0.0	6.281
	P(Bartlett's X2)						0.00*	0.00*	0.001*	0.099

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

MOSS CONTROL WITH VARIOUS PRODUCTS APPLIED BY A GARDEN HOSE SPRAYER

Trial ID: 0863TG13 Study Dir.: Prof. Bhowmik
Location: Home Garden Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	AGSPL PHYTO PERCENT Jul-09-08 7 DA-A	MOSS CONTROL PERCENT Jul-09-08 7 DA-A	AGSPL PHYTO PERCENT Jul-18-08 16 DA-A	MOSS CONTROL PERCENT Jul-18-08 16 DA-A
01	UNTREATED CHECK						0.0 b	0.0 b	0.0 b	0.0 b
02	MOSS-1 (B)-Nut			32	FL OZ/1000 FT2	POST	0.0 b	8.3 b	0.0 b	40.0 ab
03	MOSS-1 (A)			32	FL OZ/1000 FT2	POST	38.3 a	90.0 a	40.0 a	96.7 a
04	WORRY FREE MOSS			32	FL OZ/1000 FT2	POST	5.0 b	56.7 ab	5.0 b	70.0 a
05	MOSS OUT			64	FL OZ/1000 FT2	POST	0.0 b	58.3 ab	1.7 b	65.0 a
LSD (P=.05)							11.78	46.30	16.49	44.02
Standard Deviation							6.26	24.59	8.76	23.38
CV							72.21	57.63	93.81	43.03
Bartlett's X2							0.064	8.081	5.673	5.206
P(Bartlett's X2)							0.80	0.044*	0.059	0.157

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

UNIVERSITY OF MASSACHUSETTS-AMHERST

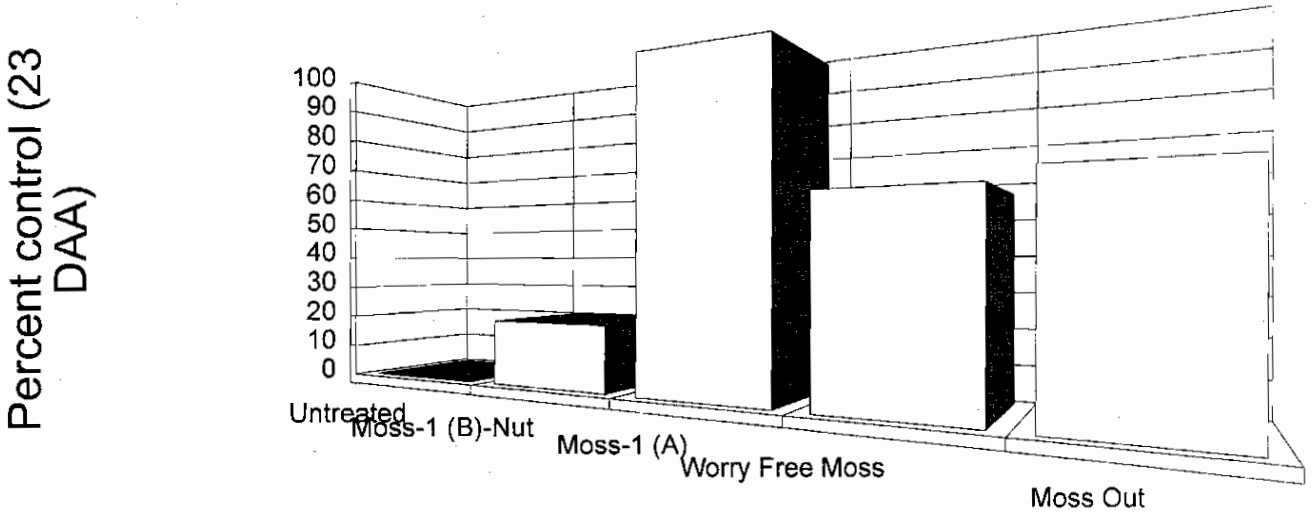
MOSS CONTROL WITH VARIOUS PRODUCTS APPLIED BY A GARDEN HOSE SPRAYER

Trial ID: 0863TG13 Study Dir.: Prof. Bhowmik
Location: Home Garden Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	AGSPL PHYTO PERCENT Jul-25-08 2 DA-A	MOSS CONTROL PERCENT Jul-25-08 23 DA-A	AGSPL PHYTO PERCENT Aug-01-08 30 DA-A	MOSS CONTROL PERCENT Aug-01-08 30 DA-A
01	UNTREATED CHECK						0.0 b	0.0 b	0.0 b	0.0 b
02	MOSS-1 (B)-Nut			32	FL OZ/1000 FT2	POST	0.0 b	20.0 b	0.0 b	11.7 b
03	MOSS-1 (A)			32	FL OZ/1000 FT2	POST	21.7 a	97.7 a	15.0 a	88.3 a
04	WORRY FREE MOSS			32	FL OZ/1000 FT2	POST	1.7 b	56.7 ab	0.0 b	51.7 ab
05	MOSS OUT			64	FL OZ/1000 FT2	POST	0.0 b	60.0 ab	0.0 b	56.7 ab
	LSD (P=.05)						7.29	51.98	0.00	48.93
	Standard Deviation						3.87	27.61	0.00	25.99
	CV						82.99	58.9	0.0	62.37
	Bartlett's X2						1.575	8.319	0.0	9.613
	P(Bartlett's X2)						0.21	0.04*	0.00*	0.022*

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

Moss control with various products applied by a garden-hose sprayer



Trial ID: 0863TG13

UNIVERSITY OF MASSACHUSETTS-AMHERST

TOLERANCE OF KENTUCKY BLUEGRASS CULTIVARS TO SULFOSULFURON - NTEP TRIAL

Trial ID: 0865TG15 Study Dir.: PROF. BHOWMIK
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

GENERAL TRIAL INFORMATION

Study Director: PROF. BHOWMIK **Title:** _____
Affiliation: _____ **Postal Code:** _____

Investigator: P. C. Bhowmik, S. Ebdon and D. Sarkar **Title:** _____
Affiliation: _____ **Postal Code:** _____

Trial Status: _____ **Initiation Date:** _____ **Country:** _____
City: _____ **State/Prov.:** _____ **Postal Code:** _____
Conducted Under GLP (Y/N): N **Conducted Under GEP (Y/N):** N

Objective: To determine the phytotoxicity of sulfosulfuron to NTEP Kentucky bluegrass cultivars

Conclusions: No phytotoxicity due to sulfosulfuron application was observed. All 172 cultivars of Kentucky bluegrass cultivars were safe to sulfosulfuron applied at 2.66 oz product/A with a NIS at 0.25% (v/v). Also, Kentucky bluegrass cultivars maintained at either at 1/2 inch or at 1.25 inch cutting height were all safe to sulfosulfuron treatment.

CROP AND PEST DESCRIPTION

Weed 1._____ _____ 2._____ _____

Crop 1: POAPR _____ **Variety:** 172 cultivars **Planting Date:** _____
Planting Method: Established **Rate:** _____ _____ **Depth:** _____
Perennial Age: 7 Years **Row Spacing:** _____ _____ **Seed Bed:** _____
Soil Temperature: _____ **Soil Moisture:** _____ **Emergence Date:** _____

Plot Width, Unit: 1.66 FT **Plot Length, Unit:** 75 FT **Reps:** 3
Site Type: _____
Tillage Type: _____ **Study Design:** RANDOMIZED COMPLETE BLOCK
Trial Initiation Comments: _____

Previous:	Crops	Pesticides	Year
1.			

MAINTENANCE

Field Prep./Maintenance: _____

No.	Date	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit
1.							

SOIL DESCRIPTION

Texture: _____ **% OM:** _____ **% Sand:** _____ **% Silt:** _____ **% Clay:** _____
pH: _____ **CEC:** _____ **Soil Name:** _____ **Fertility Level:** _____

MOISTURE CONDITIONS

On:	Date	Time	Amount	Unit	Type	Interval	Unit
1.							

Overall Moisture Conditions: _____
Closest Weather Station: _____ **Distance:** _____ **Unit:** _____

UNIVERSITY OF MASSACHUSETTS-AMHERST

APPLICATION DESCRIPTION

	A	B	C	D	E	F
Application Date:	Jul-28-08					
Time of Day:	AM					
Application Method:						
Application Timing:						
Applic. Placement:						
Air Temp., Unit:	80.4 F					
% Relative Humidity:	43.7					
Wind Velocity, Unit:	5 MPH					
Dew Presence (Y/N):						
Water Hardness:						
Soil Temp., Unit:	83.3 F	77.5 F				
Soil Moisture:	@ 0.5"	@ 2.00"				
% Cloud Cover:	10					

CROP STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Crop 1 POAPR Stage:						
Stage Scale:						
Height, Unit:						

WEED STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Weed 1 _____ Stage:						
Stage Scale:						
Density, Unit:						

APPLICATION EQUIPMENT

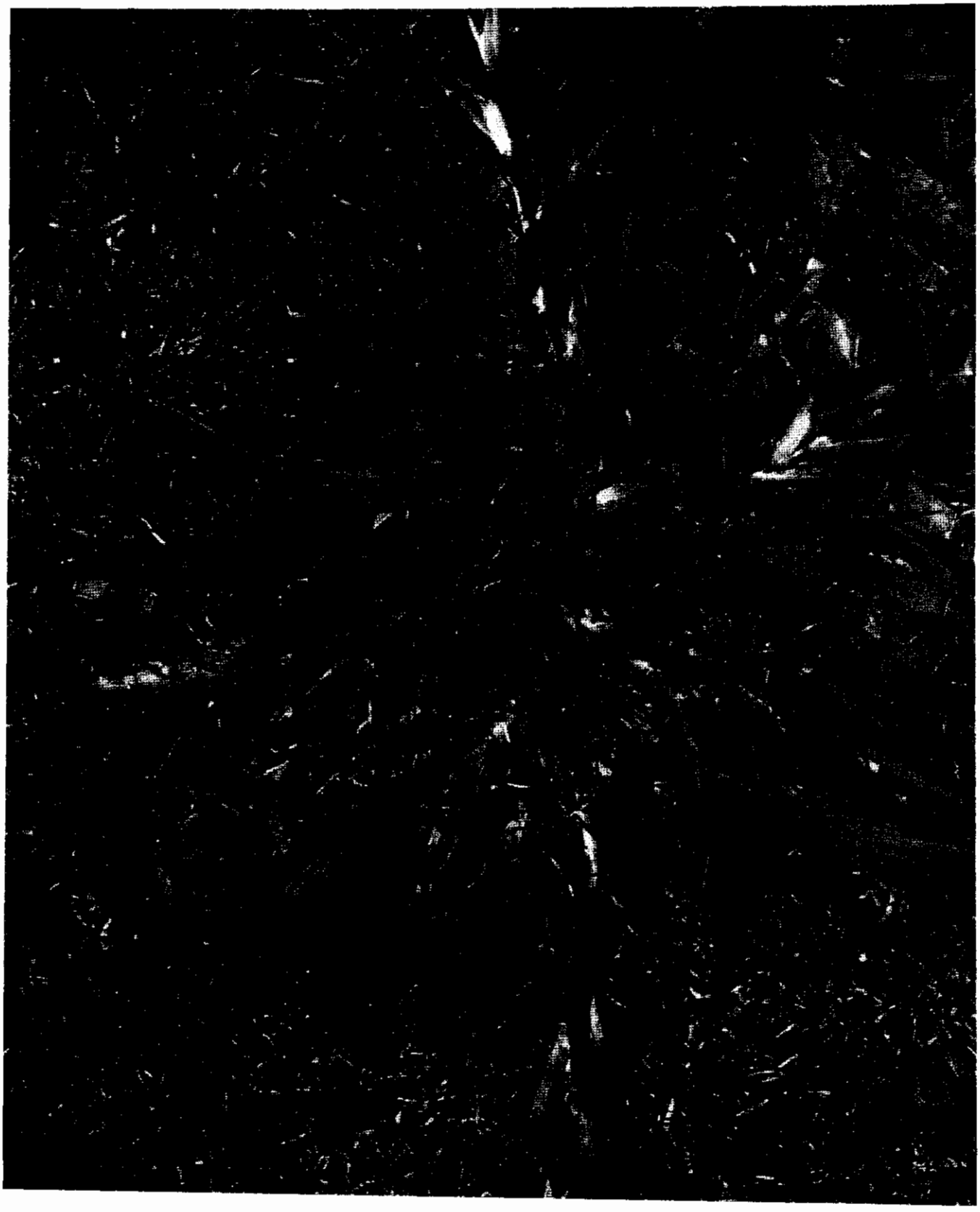
	A	B	C	D	E	F
Appl. Equipment:	BACKPACK					
Operating Pressure:	22PSI					
Nozzle Type:	TEEJET					
Nozzle Size:	1104 VS					
Nozzle Spacing, Unit:	20 INCH					
Nozzles/Row:						
Band Width, Unit:						
Boom Length, Unit:						
Boom Height, Unit:	17 INCH					
Ground Speed, Unit:						
Incorporation Equip.:						
Hours to Incorp.:						
Incorp. Depth, Unit:						
Carrier:	WATER					
Spray Volume, Unit:	50 GPA					
Spray pH:						
Propellant:						
Tank Mix (Y/N):						

Trt No	Treatment Application Comment
__	Applied to turfgrass maintained at 0.5 inch and 1.25 in mowing heights.

Table 1. Tolerance of Kentucky bluegrass cultivars to sulfosulfuron applied at 2.66 oz product/A

Entry Number Name	Entry Number Name	Entry Number Name	Entry Number Name
1. Midnight*	45. B5-43	89. Kingfisher*	133. J-2885
2. Baron*	46. B5-45	90. SRX-26351	134. Blue Velvet*
3. Lily	47. Blue-tastic*	91. SRX-27921	135. Everest*
4. Limerick	48. H92-203	92. Sonoma*	136. Awesome*
5. Bodacious*	49. Casablanca*	93. Bordeaux*	137. Excursion*
6. Bedazzled*	50. B5-144	94. Cabernet*	138. Freedom III*
7. Boomerang*	51. PST-B4-246	95. Champagne*	139. EverGlade*
8. Eagleton*	52. PST-H6-150	96. Durham*	140. Nu Destiny*
9. HV 140	53. Alpine*	97. Skye*	141. Barrister*
10. Cheetah*	54. Pich 453	98. Jewel*	142. Beyond*
11. Pp H 6366	55. Rampart*	99. Unknown	143. Rugby II*
12. Pp H 7929	56. Limousine*	100. Blue Knight*	144. Award*
13. Pp H 7832	57. Quantum leap*	101. DLF-76-9032	145. Rambo*
14. Pp H 7907	58. Envicta*	102. DLF-76-9034	146. Freedom II*
15. Monte Carlo*	59. Goldrush*	103. DLF-96-9036	147. Liberator*
16. Royale*	60. Misty*	104. DLF-96-9037	148. G0-9LM9
17. Shamrock*	61. Ascot*	105. SI-A96-386	149. Moon Shadow*
18. Wellington*	62. BH-00-6002	106. SRX-2114	150. Langara*
19. Wildwood*	63. Fairfax*	107. SR-2284*	151. A96-739
20. Hallmark*	64. Abbey*	108. Diva*	152. PST-H5-35
21. Lakeshore*	65. BH-00-6003	109. SRX-QG245	153. PST-B3-170
22. Glenmont*	66. Baronette*	110. 99AN-53	154. B4-128A
23. Coventry*	67. Raven*	111. Mongoose*	155. Bluestone*
24. Avalanche*	68. Ba-83-113	112. Jefferson*	156. Washington*
25. PST-B5-125	69. Marquis*	113. A98-407	157. A96-742
26. PST-604	70. Ba-84-140	114. A98-1028	158. A97-857
27. PST-108-79	71. Ba-82-288	115. A98-183	159. BAR-Pp-0468
28. Voyager II*	72. Chateau*	116. Champlain*	160. BAR-Pp-0471
29. PST-161	73. Ba-00-6001	117. Goldstar*	161. BAR-Pp-0568
30. Bluemax*	74. CVB-20631	118. Royce*	162. BAR-Pp-0573
31. Brilliant*	75. Chelsea*	119. A98-139	163. Bartitia*
32. PST-222	76. A97-1409	120. A98-365	164. Baritone*
33. Midnight II*	77. A96-451	121. Kenblue*	165. Bariris*
34. PST York Harbor	78. Julius*	122. Princeton 105*	166. Barzan*
35. Blacksburg II*	79. Allure*	123. Impact*	167. Baronie*
36. Mallard*	80. A97-1330	124. Total Eclipse*	168. Unique*
37. Blue Ridge*	81. H92-558	125. Odyssey*	169. Serene*
38. Apollo*	82. Julia*	126. Chicago II*	170. Moonlight*
39. A97-1432	83. Brooklawn*	127. NuGlade*	171. Blackstone*
40. HV 238	84. Boutique*	128. Perfection*	172. Rita*
41. Mercury*	85. Blue Sapphire*	129. Tsunami*	173. North Star*
42. Arrow*	86. NA-K992	130. Ginney*	
43. Moonshine*	87. Showcase*	131. Courtyard*	
44. Dynamo*	88. Arcadia*	132. Alexa*	

*Commercially available



UNIVERSITY OF MASSACHUSETTS-AMHERST

TOLERANCE OF KENTUCKY BLUEGRASS CULTIVARS TO PRIMISULFURON - NTEP TRIAL

Trial ID: 0866TG16 Study Dir.: PROF. BHOWMIK
Location: TRC-SDF Investigator: PRASANTA C. BHOWMIK

GENERAL TRIAL INFORMATION

Study Director: PROF. BHOWMIK **Title:** _____
Affiliation: _____ **Postal Code:** _____

Investigator: P. C. Bhowmik, S. Ebdon and D. Sarkar **Title:** _____
Affiliation: _____ **Postal Code:** _____

Trial Status: Completed **Initiation Date:** _____ **Country:** _____
City: _____ **State/Prov.:** _____ **Postal Code:** _____
Conducted Under GLP (Y/N): N **Conducted Under GEP (Y/N):** N

Objective: To determine the phytotoxicity of Kentucky bluegrass cultivars to primisulfuron

Conclusions: No phytotoxicity due to primisulfuron application was observed. All 172 cultivars of Kentucky bluegrass were safe to primisulsulfuron application at 0.76 oz product/A with COC at 1% (v/v). Also, Kentucky bluegrass cultivars maintained at either at 1/2 inch or 1.25 inch cutting height were all safe to primisulfuron treatment.

CROP AND PEST DESCRIPTION

Weed 1._____ _____ 2._____ _____

Crop 1:POAPR _____ **Variety:** 172 cultivars **Planting Date:** _____
Planting Method: Established **Rate:** _____ _____ **Depth:** ____ __
Perennial Age: 7 Years **Row Spacing:** ____ _____ **Seed Bed:** _____
Soil Temperature: ____ _ **Soil Moisture:** _____ **Emergence Date:** _____

Plot Width, Unit: 1.66 FT **Plot Length, Unit:** 75 FT **Reps:** 3
Site Type: _____
Tillage Type: _____ **Study Design:** RANDOMIZED COMPLETE BLOCK
Trial Initiation Comments: _____

Previous:	Crops	Pesticides	Year
1.	_____	_____	____

MAINTENANCE

Field Prep./Maintenance: _____

No.	Date	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit
1.	_____	_____	____	_____	___	_____	_____

SOIL DESCRIPTION

Texture: _____ **% OM:** ____ **% Sand:** ____ **% Silt:** ____ **% Clay:** ____
pH: ____ **CEC:** ____ **Soil Name:** _____ **Fertility Level:** _____

MOISTURE CONDITIONS

On:	Date	Time	Amount	Unit	Type	Interval	Unit
1.	_____	_____	_____	__	_____	_____	___

Overall Moisture Conditions: _____
Closest Weather Station: _____ **Distance:** _____ **Unit:** __

UNIVERSITY OF MASSACHUSETTS-AMHERST

APPLICATION DESCRIPTION

	A	B	C	D	E	F
Application Date:	Aug-27-08					
Time of Day:	Noon					
Application Method:						
Application Timing:						
Applic. Placement:						
Air Temp., Unit:	75.5 F					
% Relative Humidity:	22.2					
Wind Velocity, Unit:	2 MPH					
Dew Presence (Y/N):	_	_	_	_	_	_
Water Hardness:						
Soil Temp., Unit:	74.0 F	71.9 F				
Soil Moisture:	@ 0.5"	@ 2.00"				
% Cloud Cover:	10					

CROP STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Crop 1 POAPR Stage:						
Stage Scale:						
Height, Unit:						

WEED STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Weed 1 _____ Stage:						
Stage Scale:						
Density, Unit:						

APPLICATION EQUIPMENT

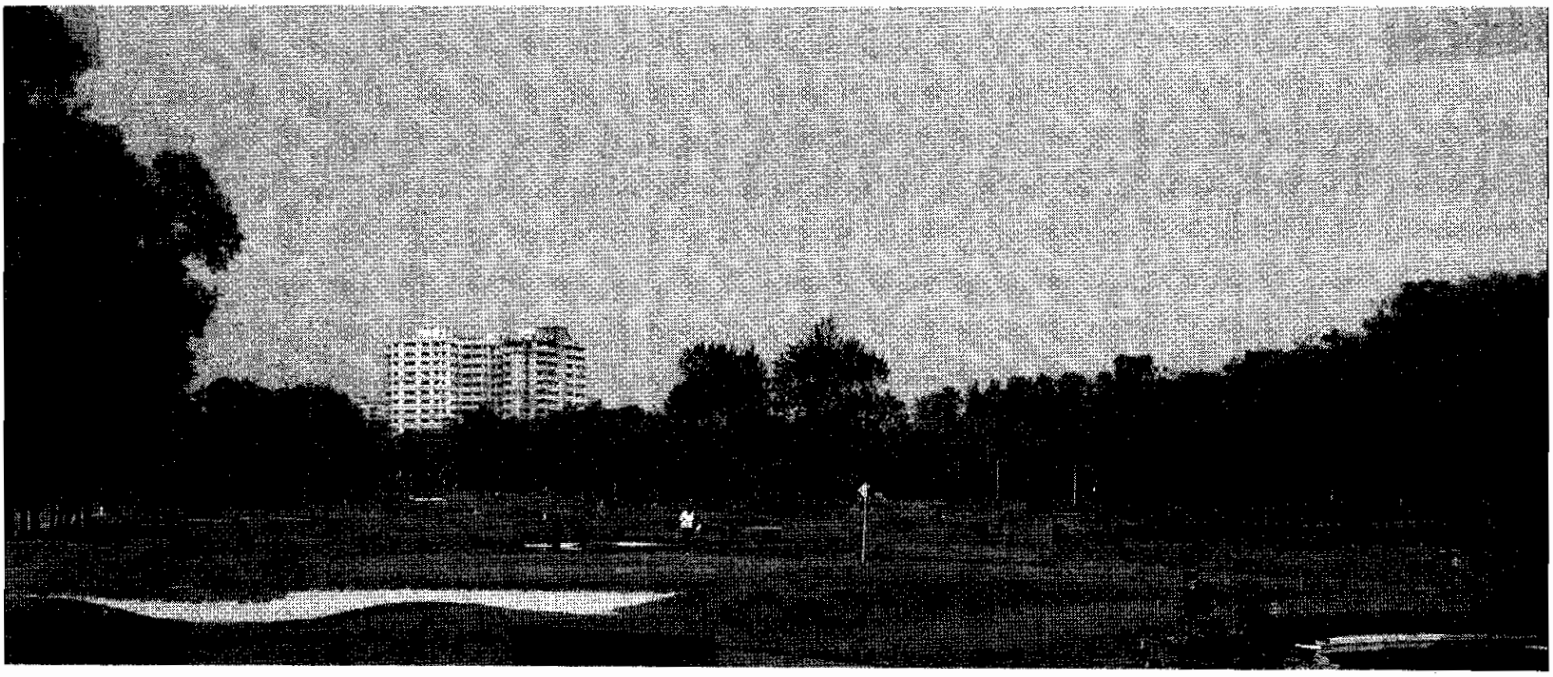
	A	B	C	D	E	F
Appl. Equipment:	BACKPACK					
Operating Pressure:	22PSI					
Nozzle Type:	TEEJET					
Nozzle Size:	1104 VS					
Nozzle Spacing, Unit:	20 INCH					
Nozzles/Row:						
Band Width, Unit:						
Boom Length, Unit:						
Boom Height, Unit:	17 INCH					
Ground Speed, Unit:						
Incorporation Equip.:						
Hours to Incorp.:						
Incorp. Depth, Unit:						
Carrier:	WATER					
Spray Volume, Unit:	50 GPA					
Spray pH:						
Propellant:						
Tank Mix (Y/N):	_	_	_	_	_	_

Trt No	Treatment Application Comment
__	Applied to turfgrass mainted at two mowing heights (0.5 and 1.25 in)

Table 1. Tolerance of Kentucky bluegrass cultivars to primisulfuron applied at 0.76 oz product/A

Entry Number Name	Entry Number Name	Entry Number Name	Entry Number Name
1. Midnight*	45. B5-43	89. Kingfisher*	133. J-2885
2. Baron*	46. B5-45	90. SRX-26351	134. Blue Velvet*
3. Lily	47. Blue-tastic*	91. SRX-27921	135. Everest*
4. Limerick	48. H92-203	92. Sonoma*	136. Awesome*
5. Bodacious*	49. Casablanca*	93. Bordeaux*	137. Excursion*
6. Bedazzled*	50. B5-144	94. Cabernet*	138. Freedom III*
7. Boomerang*	51. PST-B4-246	95. Champagne*	139. EverGlade*
8. Eagleton*	52. PST-H6-150	96. Durham*	140. Nu Destiny*
9. HV 140	53. Alpine*	97. Skye*	141. Barrister*
10. Cheetah*	54. Pich 453	98. Jewel*	142. Beyond*
11. Pp H 6366	55. Rampart*	99. Unknown	143. Rugby II*
12. Pp H 7929	56. Limousine*	100. Blue Knight*	144. Award*
13. Pp H 7832	57. Quantum leap*	101. DLF-76-9032	145. Rambo*
14. Pp H 7907	58. Envicta*	102. DLF-76-9034	146. Freedom II*
15. Monte Carlo*	59. Goldrush*	103. DLF-96-9036	147. Liberator*
16. Royale*	60. Misty*	104. DLF-96-9037	148. G0-9LM9
17. Shamrock*	61. Ascot*	105. SI-A96-386	149. Moon Shadow*
18. Wellington*	62. BH-00-6002	106. SRX-2114	150. Langara*
19. Wildwood*	63. Fairfax*	107. SR-2284*	151. A96-739
20. Hallmark*	64. Abbey*	108. Diva*	152. PST-H5-35
21. Lakeshore*	65. BH-00-6003	109. SRX-QG245	153. PST-B3-170
22. Glenmont*	66. Baronette*	110. 99AN-53	154. B4-128A
23. Coventry*	67. Raven*	111. Mongoose*	155. Bluestone*
24. Avalanche*	68. Ba-83-113	112. Jefferson*	156. Washington*
25. PST-B5-125	69. Marquis*	113. A98-407	157. A96-742
26. PST-604	70. Ba-84-140	114. A98-1028	158. A97-857
27. PST-108-79	71. Ba-82-288	115. A98-183	159. BAR-Pp-0468
28. Voyager II*	72. Chateau*	116. Champlain*	160. BAR-Pp-0471
29. PST-161	73. Ba-00-6001	117. Goldstar*	161. BAR-Pp-0568
30. Bluemax*	74. CVB-20631	118. Royce*	162. BAR-Pp-0573
31. Brilliant*	75. Chelsea*	119. A98-139	163. Bartitia*
32. PST-222	76. A97-1409	120. A98-365	164. Baritone*
33. Midnight II*	77. A96-451	121. Kenblue*	165. Bariris*
34. PST York Harbor	78. Julius*	122. Princeton 105*	166. Barzan*
35. Blacksburg II*	79. Allure*	123. Impact*	167. Baronie*
36. Mallard*	80. A97-1330	124. Total Eclipse*	168. Unique*
37. Blue Ridge*	81. H92-558	125. Odyssey*	169. Serene*
38. Apollo*	82. Julia*	126. Chicago II*	170. Moonlight*
39. A97-1432	83. Brooklawn*	127. NuGlade*	171. Blackstone*
40. HV 238	84. Boutique*	128. Perfection*	172. Rita*
41. Mercury*	85. Blue Sapphire*	129. Tsunami*	173. North Star*
42. Arrow*	86. NA-K992	130. Ginney*	
43. Moonshine*	87. Showcase*	131. Courtyard*	
44. Dynamo*	88. Arcadia*	132. Alexa*	

*Commercially available



UNIVERSITY OF MASSACHUSETTS-AMHERST

COMPARISON OF AVENGER MOSS PRODUCTS IN MOSS CONTROL

Trial ID: 0867TG17 Study Dir.:
Location: GH-Study Investigator: PRASANTA C. BHOWMIK

GENERAL TRIAL INFORMATION

Study Director: Prof. Bhowmik **Title:** _____
Affiliation: _____ **Postal Code:** _____

Investigator: P. C. Bhowmik and D. Sarkar **Title:** _____
Affiliation: _____ **Postal Code:** _____

Trial Status: Completed **Initiation Date:** _____ **Country:** _____
City: _____ **State/Prov.:** _____ **Postal Code:** _____
Conducted Under GLP (Y/N): N **Conducted Under GEP (Y/N):** N

Objective: To compare Avenger products in controlling moss.

Conclusions:

CROP AND PEST DESCRIPTION

Weed 1._____ _____ **2.**_____ _____

Crop 1:_____ _____ **Variety:** _____ **Planting Date:** _____
Planting Method: _____ **Rate:** _____ _____ **Depth:** _____
Perennial Age: _____ _____ **Row Spacing:** _____ _____ **Seed Bed:** _____
Soil Temperature: _____ **Soil Moisture:** _____ **Emergence Date:** _____

Plot Width, Unit: 1 FT **Plot Length, Unit:** 1 FT **Reps:** 4
Site Type: _____
Tillage Type: _____ **Study Design:** RANDOMIZED COMPLETE BLOCK
Trial Initiation Comments: Moss was grown in pots in a growth room.

Previous:	Crops	Pesticides	Year
1.			

MAINTENANCE

Field Prep./Maintenance: _____

No.	Date	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit
1.							

SOIL DESCRIPTION

Texture: _____ **% OM:** _____ **% Sand:** _____ **% Silt:** _____ **% Clay:** _____
pH: _____ **CEC:** _____ **Soil Name:** _____ **Fertility Level:** _____

MOISTURE CONDITIONS

On:	Date	Time	Amount	Unit	Type	Interval	Unit
1.							

Overall Moisture Conditions: _____
Closest Weather Station: _____ **Distance:** _____ **Unit:** _____

UNIVERSITY OF MASSACHUSETTS-AMHERST

APPLICATION DESCRIPTION

	A	B	C	D	E	F
Application Date:	Oct-28-08					
Time of Day:						
Application Method:	Spray					
Application Timing:						
Applic. Placement:						
Air Temp., Unit:						
% Relative Humidity:						
Wind Velocity, Unit:						
Dew Presence (Y/N):						
Water Hardness:						
Soil Temp., Unit:						
Soil Moisture:						
% Cloud Cover:						

CROP STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Crop 1 _____ Stage:						
Stage Scale:						
Height, Unit:						

WEED STAGE AT EACH APPLICATION

	A	B	C	D	E	F
Weed 1 _____ Stage:						
Stage Scale:						
Density, Unit:						

APPLICATION EQUIPMENT

	A	B	C	D	E	F
Appl. Equipment:	H.sprayer					
Operating Pressure:						
Nozzle Type:						
Nozzle Size:						
Nozzle Spacing, Unit:						
Nozzles/Row:						
Band Width, Unit:						
Boom Length, Unit:						
Boom Height, Unit:						
Ground Speed, Unit:						
Incorporation Equip.:						
Hours to Incorp.:						
Incorp. Depth, Unit:						
Carrier:	Water					
Spray Volume, Unit:	217 GPA					
Spray pH:						
Propellant:						
Tank Mix (Y/N):						

Trt No	Treatment Application Comment
__	Treatments were at 1, 2 and 5 percent (v/v) of application.

UNIVERSITY OF MASSACHUSETTS-AMHERST

COMPARISON OF AVENGER MOSS PRODUCTS IN MOSS CONTROL

Trial ID: 0867TG17 Study Dir.:
Location: GH-Study Investigator: PRASANTA C. BHOWMIK

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	Gar-Moss Control Percent Nov-12-08	Gar-Moss Control Percent Nov-25-08
	Weed Code							
	Rating Data Type							
	Rating Unit							
	Rating Date							
01	Untreated Control						0.0 d	0.0 c
02	Avenger Moss (REG)			1	% V/V	POST	17.5 cd	13.8 c
03	Avenger Moss (REG)			2	% V/V	POST	43.8 bc	35.0 bc
04	Avenger Moss (REG)			5	% V/V	POST	81.3 a	69.5 ab
05	Avenger-Moss (PH-UP)			1	% V/V	POST	18.8 cd	28.8 c
06	Avenger-Moss (PH-UP)			2	% V/V	POST	55.0 ab	65.0 ab
07	Avenger-Moss (PH-UP)			5	% V/V	POST	77.5 a	82.5 a
	LSD (P=.05)						24.14	29.11
	Standard Deviation						16.25	19.59
	CV						38.73	46.57
	Bartlett's X2						18.397	7.625
	P(Bartlett's X2)						0.002*	0.178

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

Turfgrass and Weed Code Index

Turfgrass

Creeping bentgrass	AGSPL
Kentucky bluegrass	POAPR
Perennial ryegrass	LOLPE
Tall fescue	FESAR

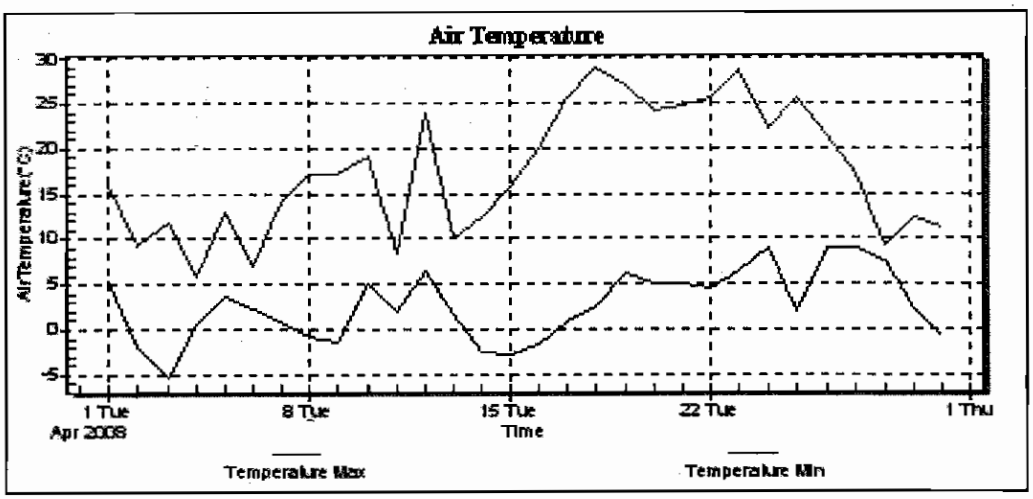
Weeds

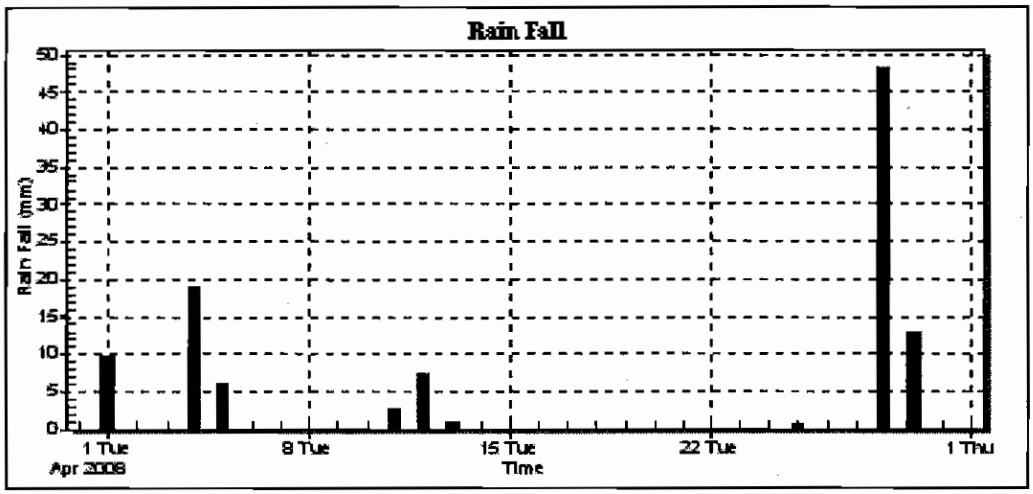
Annual bluegrass	POAN
Large crabgrass	DIGSA
Yellow foxtail	SETLU
Common chickweed	STEME
Common plantain	PLAMA
Dandelion	TAROF
Mouse-ear chickweed	CERVU
White clover	TRIRE

Joseph Troll Turfgrass Research Center
South Deerfield, MA

Weather Station: ET106

Weather Station: ET106
Location: Joseph Troll Turf Research Center
Report Type: Custom Day
Created: Thursday, June 19, 2008 2:05 PM
Report Period: Tuesday, April 01, 2008 - Thursday, May 01, 2008





Air Temperature and Rainfall - April, 2008

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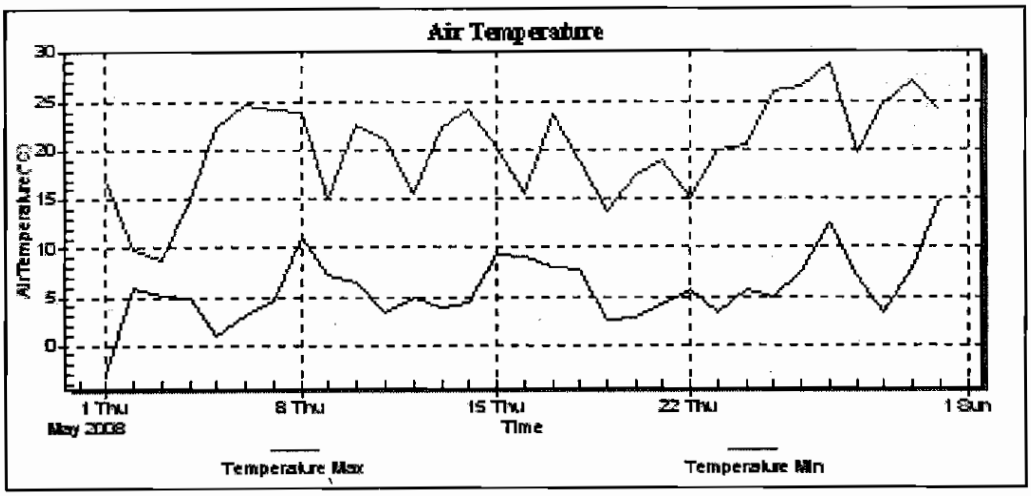

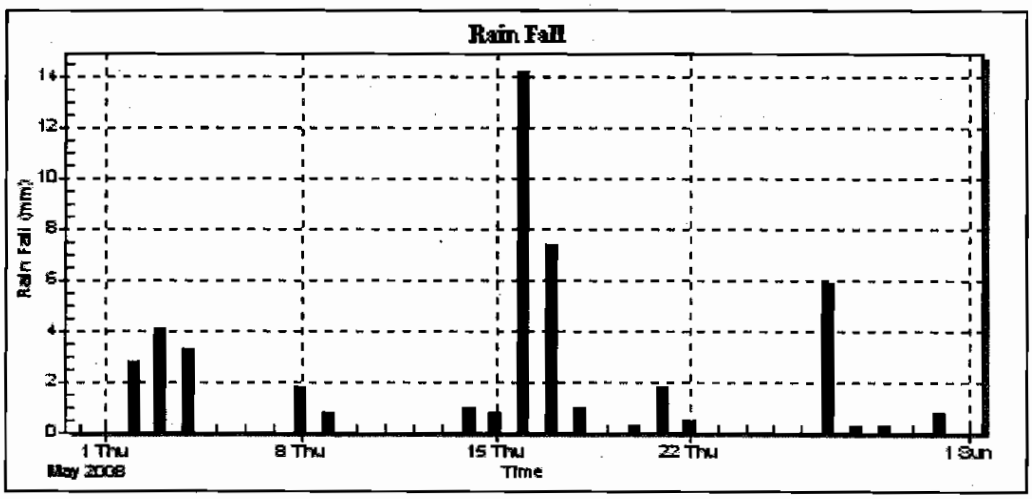

Air Temperature and Rainfall - May, 2008

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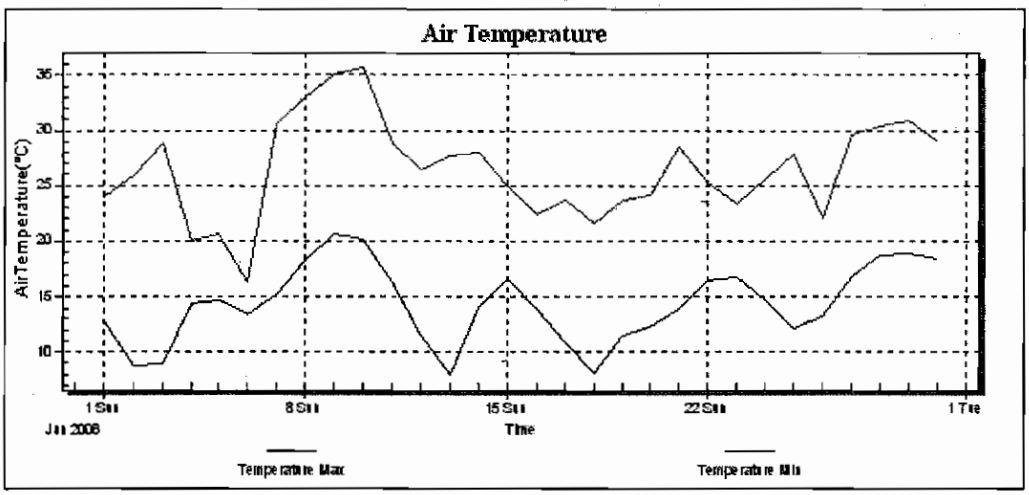
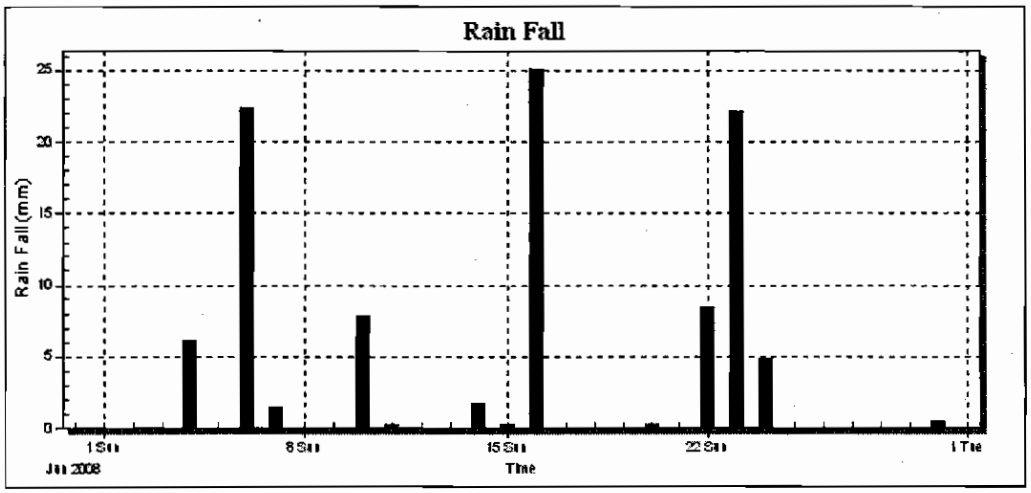
Report Period: June 2008





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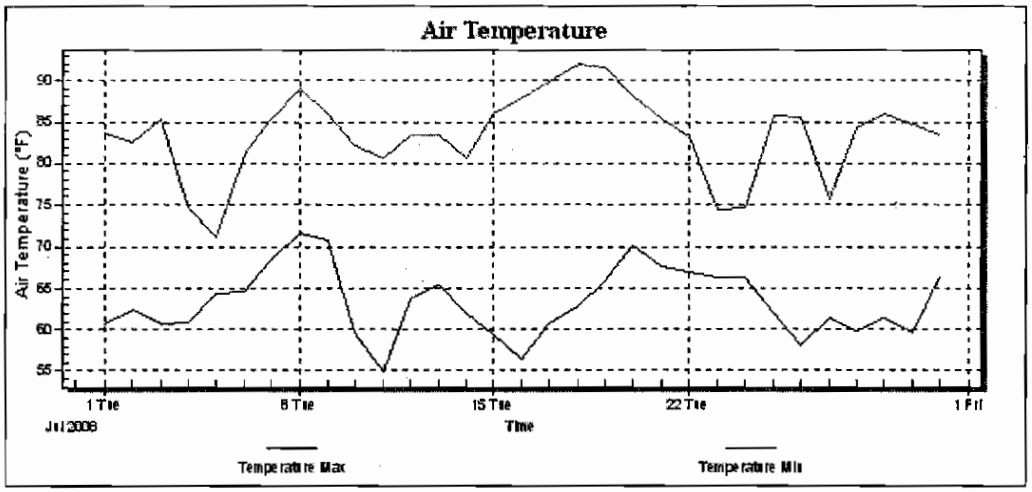

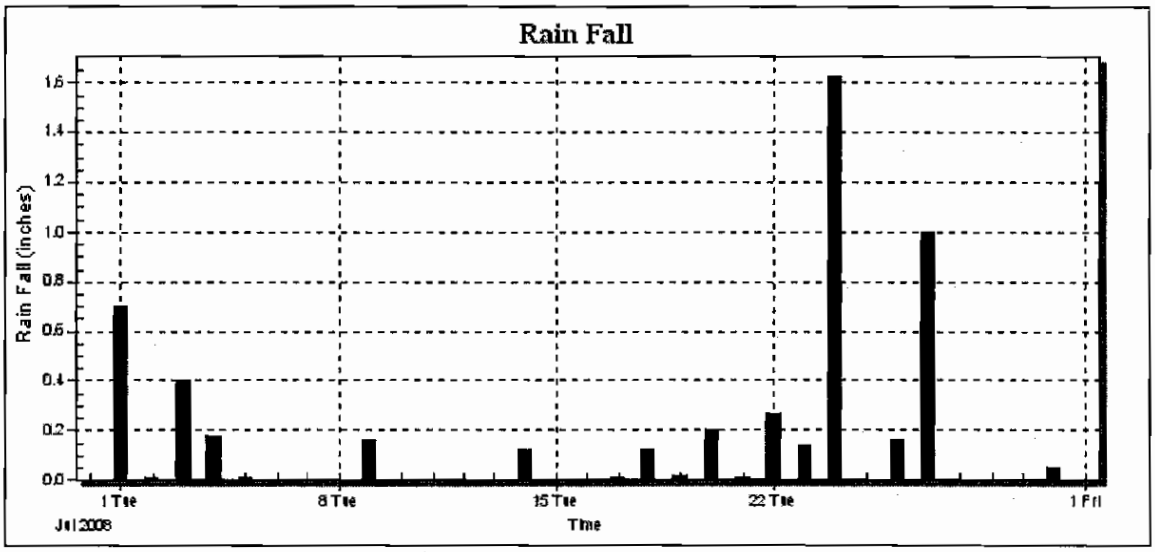

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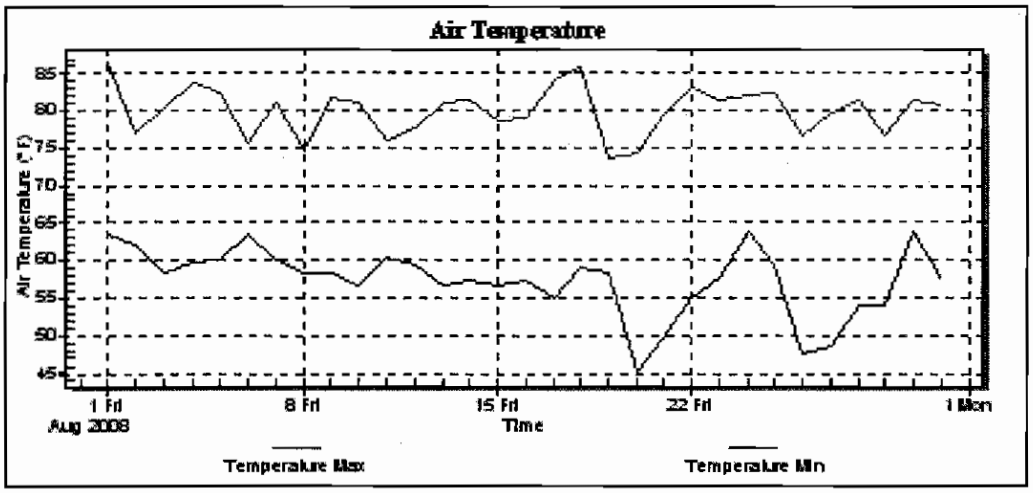

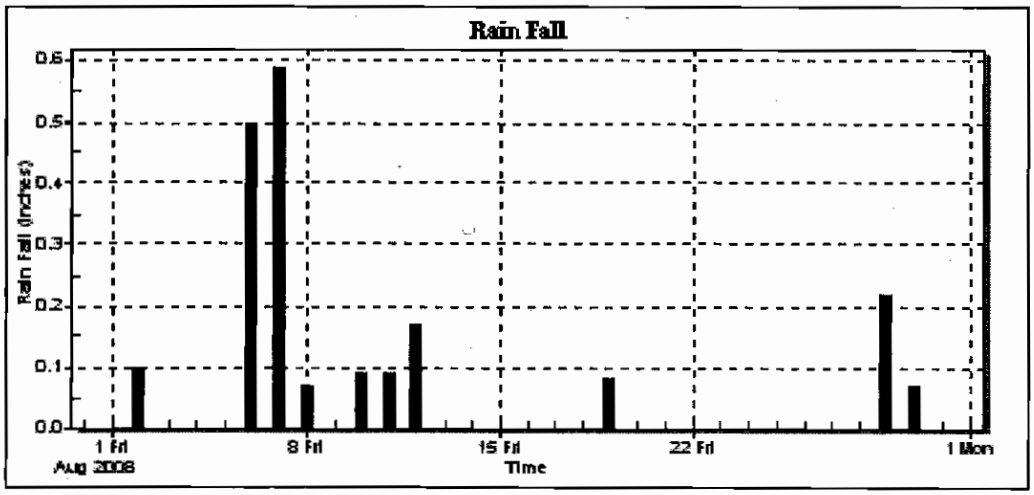

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International:

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Characteristics and Significance of Japanese Knotweed : An Invasive Species

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Poster No. 38669
2008 International Weed Science Congress
June 22-27, Vancouver, Canada

BACKGROUND

Polygonum cuspidatum Sieb. & Zucc. (Japanese knotweed) is an invasive, herbaceous perennial. This species, a native of South-East Asia, was introduced to Europe in 1825 as an ornamental hedge and it was subsequently introduced to the United States by late nineteenth century (Barney et al. 2006). Because of its tenuous growth habit it escaped from cultivation, and is currently one of the serious weeds in 36 states of the United States (Figure 1).

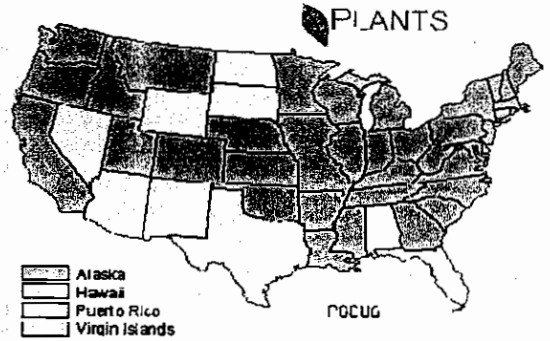

Figure 1. Distribution of *Polygonum cuspidatum in the United States*

COLONIZATION

Polygonum cuspidatum colonizes a wide variety of habitats such as wetlands, waste places, along roadways, and other disturbed sites (Bhowmik et al. 2004). It spreads quickly to form dense monoculture stands by crowding out all other native vegetation, and greatly alter the natural ecosystem (Figure 2 A & B).

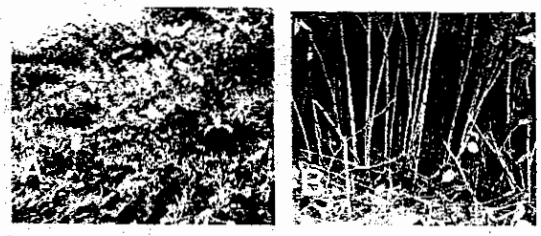

Figure 2. Infestation of *Polygonum cuspidatum*

ECOLOGICAL IMPACTS

This species forms monoculture stands and greatly alter the natural ecosystem. It reduces biodiversity. *Polygonum* stands alter rate of organic matter decomposition. Infestations are a severe threat to riparian areas.

GROWTH HABIT

Plants can grow over 300 cm in height. Stems are hollow, smooth, stout and are swollen at the nodes (Figure 3). Leaves are normally about 15 cm long by 7 to 10 cm wide, broadly ovate with pointed tips (Figure 4 A). Flowers are greenish white and on a branched panicle (Figure 4 B). Plants are strictly dioecious, and except from its native habitat, the occurrence of male plants is very rare. Populations rely solely on vegetative regeneration of rhizomes for propagation. An extensive rhizome system may spread up to about 6 m laterally and to a depth of 180 to 210 cm.

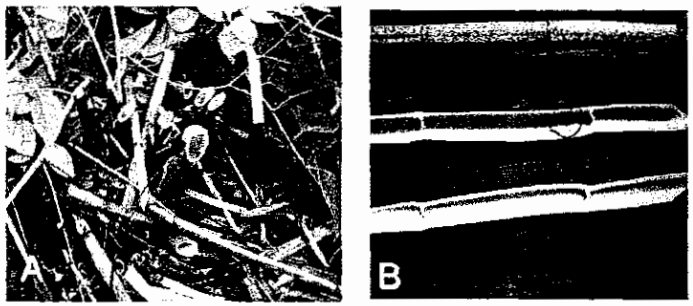

Figure 3. Hollow stems (A and B) of *Polygonum cuspidatum*

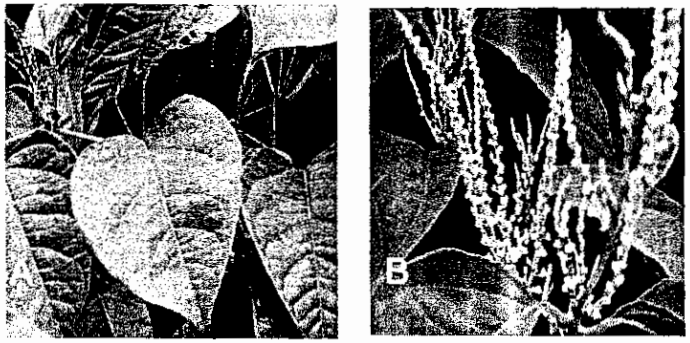

Figure 4. Typical characteristic of heart-shaped leaf with pointed tip (A) and greenish-white inflorescence on axillary panicle (B)

CONTROL STRATEGIES

Established *Polygonum* populations are extremely persistent, and are difficult to control. Mechanical control is not an easy task (Figure 5). Repeated mechanical control at monthly intervals can be successful in depleting carbohydrate reserves. Glyphosate at 2. kg/ha applied POST effectively controls this species. Limited biological control is available.

PHENOLOGY

New shoots appear in early spring from underground rhizomes (as deep as 1 m) after over-wintering. Established plants flower in late August or early September. Plants senesce after reproduction and the above ground parts are killed by the first frost. Established *Polygonum* populations are extremely persistent, and are difficult to control. High regenerative capacity of the stem and rhizome fragments makes mechanical control more difficult and limited control strategies are currently available.

Figure 5. Mechanical control of *Polygonum cuspidatum*

CONCLUSIONS

- *Polygonum cuspidatum* is an invasive, herbaceous perennial in 36 states of the United States. It is a native of South-East Asia.
- *It* colonizes a wide variety of habitats such as wetlands, waste places, along roadways, and other disturbed sites.
- It spreads quickly to form dense monoculture stands and greatly alter the natural ecosystem.
- Populations rely solely on vegetative regeneration of rhizomes for propagation.
- Stands are extremely persistent, and are difficult to control.

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-77-

Carbohydrate Partitioning of Creeping Bentgrass as Influenced by Nitrogen Fertilization and a Plant Growth Regulator

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Introduction

Total nonstructural carbohydrates (TNC) in turfgrasses are a valuable indicator of assimilate translocation and physiological responses to management practices and environmental conditions. Partitioning of TNC to turfgrass roots, crown and shoots dictate their performance under stress conditions (Davis and Dernoeden, 1991; Huang and Gao, 2000). Furthermore, TNC content may be influenced by different turfgrass management practices, such as nitrogen fertilization and application of plant growth regulators. Reduction in carbohydrate levels following nitrogen applications may be important as they relate to stress tolerance in cool-season turfgrasses. Trinexapac-ethyl (TE), a gibberelic acid inhibitor, has been the most widely utilized chemical for preparing turfgrasses under various types of stress. Han et al. (1998) reported increased levels of total soluble carbohydrates in creeping bentgrass (*Agrostis stolonifera* L.) following application of TE. However, limited information is available on the interactive effects of N fertility and plant growth regulators (TE) on TNC distribution of creeping bentgrass.

Objective

The objective of this study was to determine the effect of N fertilization and TE on TNC partitioning of creeping bentgrass (cv. Penncross).

Materials and Methods

Field experiment: The field study was initiated in the spring of 2006 on a 4-yr-old sand based putting green. The experiment was arranged as a split plot design, with nitrogen fertilization as the main plot (13.63, 22.72, and 36.36 kg N /ha/year) and TE as the sub-plot (with and without TE) with four replications. Nitrogen was applied monthly from May to October, and TE (Primo Maxx) was applied in three applications from April to August (0.47 kg a.i./ha). Root and shoot samples were collected from each plot at 15 d intervals and analyzed for TNC content using a colorimetric method.

Growth chamber experiment: 'Penncross' creeping bentgrass plugs were collected from a 4-yr-old sand based putting green Plugs were placed into polytubes (6.5 cm diameter, 25 cm length) filled with a sand and soil mix (4:1, v/v). The growth chamber was maintained at 20°C constant temperature, with 12 h photoperiod under fluorescent white light (265 μmol m^{-2} s^{-1}). After one month of active turfgrass growth, three levels of N were applied (0.57, 0.94, and 1.51 kg N /ha/ application) weekly by using water soluble fertilizer in each week for one month before application of TE (Primo Maxx EC 0.47 kg a.i./ha). The experiment was arranged in a split-plot design and root and shoot samples were collected 8, 15, and 30 d after TE treatment for TNC analysis.

The effects of nitrogen, TE, and corresponding interactions were determined by analysis of variance using the SAS system software. Significant differences were separated by the LSD test at $P \leq 0.05$.

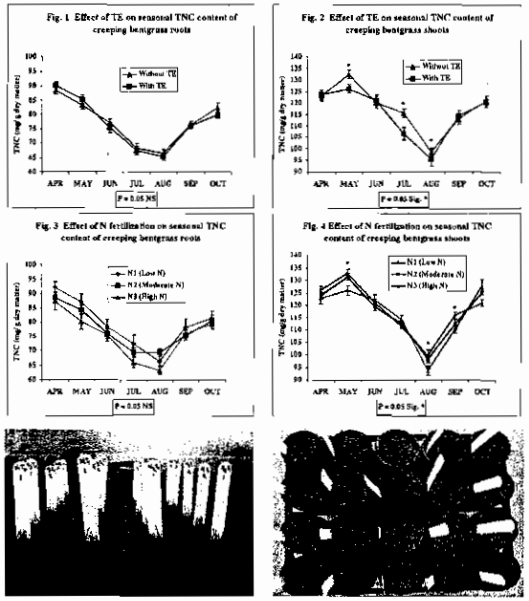

Fig 5. Creeping bentgrass plugs in the growth chamber experiment.

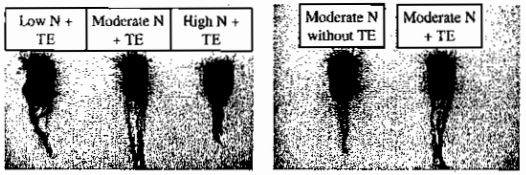

Fig 6. Effect of N fertilizer and TE on root growth of creeping bentgrass.

Results and discussion

❖ There was no significant interaction between nitrogen rate and TE application, so results are presented according to the main effects.

❖ N fertilization significantly influenced TNC content of creeping bentgrass shoots, and higher TNC content was observed with low N application (13.63 kg N/ha/year) in the field experiment.

❖Effect of N fertilization and TE on TNC content of creeping bentgrass roots were not significant in field experiment throughout the season.

❖In the growth chamber experiment, N fertilization significantly influenced TNC content of creeping bentgrass shoots, and higher TNC content was observed with moderate N application (22.72 kg N/ha/year), but there was no significant influence of TE on TNC content of creeping bentgrass shoots.

❖TNC content of both creeping bentgrass shoots and roots were significantly higher 30 days after TE treatment in TE treated creeping bentgrass plants under growth chamber experiment.

Table 1. Effect of N fertilization on TNC content (mg/g dry matter) of creeping bentgrass shoots and roots 30 d after TE treatment. Different letters within the same column indicate significant differences at $P \leq 0.05$.

Treatment	Shoots	Roots
Low N	114.7 ab	80.8 b
Moderate N	118.4 a	85.5 a
High N	111.2 b	78.7 b

Table 2. Effect of TE on TNC content (mg/g dry matter) of creeping bentgrass shoots and roots 30 d after TE treatment. Different letters within the same column indicate significant differences at $P \leq 0.05$.

Treatment	Shoots	Roots
Without TE	113.2 a	77.8 b
With TE	116.3 a	85.5 a

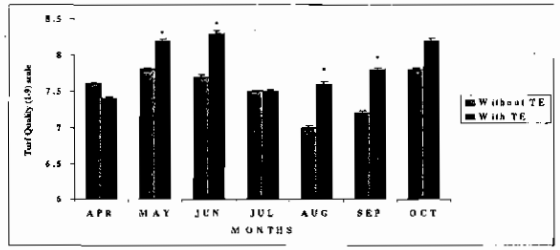

Fig. 7. Effect of TE on seasonal changes of creeping bentgrass turf quality under putting green condition. Data are presented with standard error bars.

Summary and Conclusion

❖ In both field and growth chamber experiments, N fertilization significantly influenced TNC content of creeping bentgrass shoots and roots, with increased levels of TNC observed in response to low and moderate N rate compared to high N rate.

❖The influence of TE on TNC content of both creeping bentgrass roots and shoots was not significant as compared to the effect of N fertilization in our experiments.

❖ As TNC content is one of the key indicator for the stress tolerance mechanism of turfgrass plants, it is better to maintain creeping bentgrass with low N rate for acceptable summer stress tolerance.

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Presented at the Joint Annual Meeting of ASA-CSSA-SSSA October 5-9, 2008 Houston, TX