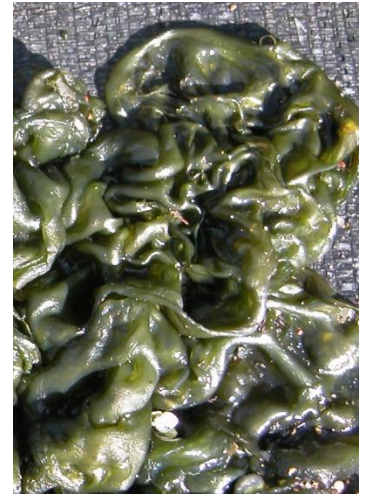


FN15Nostoc

Objective: to determine the effectiveness of different herbicides on Nostoc in gravel in container nurseries.

Summary: On July 24, 2015, herbicide treatments were applied to a container nursery gravel roadway, which had been scraped clean earlier that day. Treatments were applied using a CO2 pressurized 2L bottle sprayer. See table below for treatments. Plots measured 5' x 18' and were arranged in a randomized complete block design with 4 replications. The percentage of plot area covered by Nostoc was evaluated 1 and 6 weeks after treatment (WAT).



Treatment
Marengo 0.622 SC at 7.5 fl. oz/A
Marengo 0.622 SC at 15 fl. oz/A
Marengo 0.622 SC at 7.5 fl. oz/A + diquat 2L at 1 qt/A
Marengo 0.622 SC at 15 fl. oz/A + diquat 2L at 1 qt/A
Sureguard 51 DF at 10 oz wt/A
Sureguard 51 DF at 10 oz wt/A + diquat 2L at 1 qt/A
Diuron (Direx) 4L at 2 qt/A
Diuron (Direx) 4L at 2 qt/A + diquat 2L at 1 qt/A
Simazine (Princep) 4L at 2 qt/A
Simazine (Princep) 4L at 2 qt/A + diquat 2L at 1 qt/A
Diquat 2L at 1 qt/A

*All treatments had a nonionic surfactant added at 0.25% v/v

RESULTS:

Although the area chosen had uniform populations of *Nostoc* prior to initiating this study, the percent cover and distribution of *Nostoc* were highly variable. However, several observations can be drawn from this data.

- A single application of Diquat was ineffective. No clear symptoms of injury to the nostoc were visible.
- Simazine and diuron provided nearly complete control of nostoc with or without diquat.
- Higher % cover of nostoc in plots treated with the high dose of Marengo compared to the lower dose suggests that Marengo is ineffective. The addition of diquat to Marengo may improve control.
- Sureguard was ineffective with or without the addition of diquat.

These data suggest that photosynthetic inhibitor herbicides have potential for nostoc control in gravel areas of container nurseries. However due to the water solubility and potential for off-target movement from these herbicides, more research into minimum effective doses and other alternatives are needed.

North Carolina State University

PRE / POST control of Nostoc on gravel in container nurseries

Trial ID: FN15Nostoc
Location: Fowler's Nursery

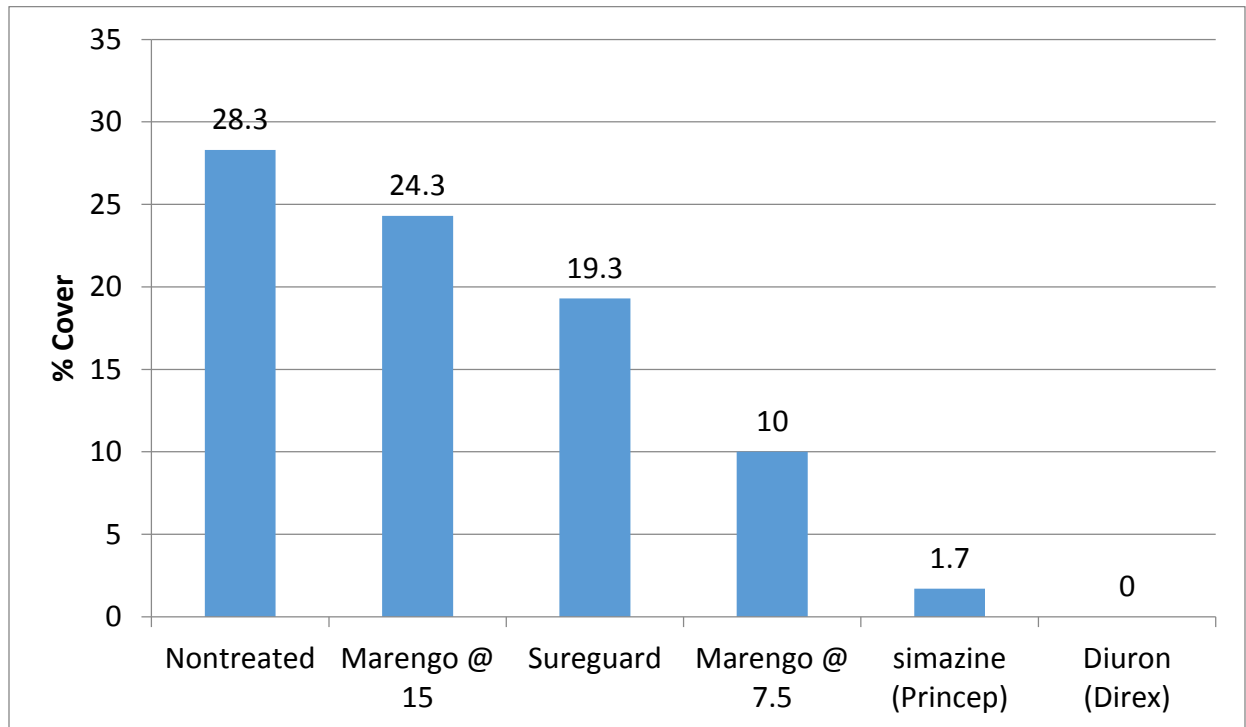
Protocol ID: FN15Nostoc
Study Director: Neal
Investigator: Joseph C. Neal, Ph.D.

Pest Type						W Weed	W Weed
Pest Name						NOSTOC	NOSTOC
Description							
Rating Date						08/20/15	09/17/15
Rating Data Type						AREA	AREA
Rating Unit						%	%
Days After First/Last Applic.						28 28	56 56
Trt-Eval Interval						28 DA-A	56 DA-A
Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Appl Unit Code	1	4
1	Non-treated					27.5 abc	28.3 ab
7	diquat (Reward)	2 L		1 qt/a	B	35.0 ab	23.8 bc
	nonionic surfactant	100 L		0.25 % v/v	B		
2	Marengo	0.622 SC		7.5 fl oz/a	A	23.8 a-d	10.0 cde
	nonionic surfactant	100 L		0.25 % v/v	A		
8	Marengo	0.622 SC		7.5 fl oz/a	B	9.3 cde	2.5 de
	diquat (Reward)	2 L		1 qt/a	B		
	nonionic surfactant	100 L		0.25 % v/v	B		
3	Marengo	0.622 SC		15 fl oz/a	A	38.0 a	24.3 bc
	nonionic surfactant	100 L		0.25 % v/v	A		
9	Marengo	0.622 SC		15 fl oz/a	B	26.3 a-d	11.8 b-e
	diquat (Reward)	2 L		1 qt/a	B		
	nonionic surfactant	100 L		0.25 % v/v	B		
4	Sureguard	51 DF		10 oz wt/a	A	16.3 b-e	19.3 bcd
	nonionic surfactant	100 L		0.25 % v/v	A		
10	Sureguard	51 DF		10 oz wt/a	B	36.5 ab	43.3 a
	diquat (Reward)	2 L		1 qt/a	B		
	nonionic surfactant	100 L		0.25 % v/v	B		
5	Diuron (Direx)	4 L		2 qt/a	A	0.5 e	0.0 e
	nonionic surfactant	100 L		0.25 % v/v	A		
11	Diuron (Direx)	4 L		2 qt/a	B	0.8 e	0.0 e
	diquat (Reward)	2 L		1 qt/a	B		
	nonionic surfactant	100 L		0.25 % v/v	B		
6	simazine (Princep)	4 L		2 qt/a	A	5.5 de	1.7 e
	nonionic surfactant	100 L		0.25 % v/v	A		
12	simazine (Princep)	4 L		2 qt/a	B	2.8 e	1.3 e
	diquat (Reward)	2 L		1 qt/a	B		
	nonionic surfactant	100 L		0.25 % v/v	B		
LSD (P=.05)						20.81	16.91
Standard Deviation						14.41	11.63
CV						77.89	83.98
Replicate F						0.097	0.894
Replicate Prob(F)						0.9611	0.4576
Treatment F						4.014	5.792
Treatment Prob(F)						0.0009	0.0001

Means followed by same letter do not significantly differ (P=.05, LSD)

*by the 6 WAT evaluation, nursery staff had moved plants from some areas. In this process some plot areas were disrupted and irrigation was off, affecting the noxtoc populations. Plots affected by this were omitted from the "adjusted analysis".

Efficacy of PRE herbicides on *Nostoc* algae percent ground cover, 6 weeks after treatment.





Nostoc infestation in gravel area of nursery. Bare area in the background was treated with diuron.

Experiment #: FN15Nostoc

Title: PRE/POST Control of Nostoc on Gravel in Container Nurseries

Location: Fowler's Nursery, Clayton, NC

Soil Type / Substrate: Gravel roadway (~6" deep gravel) mixed with soil

Application Equipment: CO₂-pressurized bottle sprayer

and type of nozzle: 3-8006 XR

PSI: 28

Speed: 3 mph

GPA: 30

Experimental Design: RCB

Replicates: 4

of treatments: 12

Plants/species/plot: NA

Plot size: 5' x 18'

Potting date: NA

Pot size: NA

APPLICATION INFORMATION

DATE 7/24/2015

Calibration (ml/15 sec) 286

target: 284 (30 GPA) or 473 (50 GPA)

TREATMENTS APPLIED all

SOIL MOISTURE moist

SOIL CONDITION compacted; scraped
w/box blade today

TEMPERATURES (°F)

air 89

soil surface/2 in/6 in 91/92/89

SKY 20% cloud cover

WIND SPEED (mph), DIRECTION 1-4 mph, N

Date of first rain (R) or irrigation (I) 7/25/2015 (likely)

Amount (inches) R or I ?

WEED Status:

Algae (Nostoc) Gravel scrapped
with a box blade
prior to treatment

CROP Status: NA

North Carolina State University

PRE / POST control of Nostoc on gravel in container nurseries

Trial ID: FN15Nostoc
Location: Fowler's Nursery

Protocol ID: FN15Nostoc
Study Director: Neal
Investigator: Joseph C. Neal, Ph.D.

Pest Type								W Weed	W Weed
Pest Name								NOSTOC	NOSTOC
Description									
Rating Date								08/20/15	09/17/15
Rating Data Type								AREA	AREA
Rating Unit								%	%
Days After First/Last Applic.								28 28	56 56
Trt-Eval Interval								28 DA-A	56 DA-A
Trt	Treatment	Form	Form	Rate	Appl				
No.	Name	Conc	Type	Rate	Unit	Code	Plot	1	4
1	Non-treated						108	50.0	60.0
							210	30.0	20.0
							301	20.0	5.0
							408	10.0	.
							Mean =	27.5	28.3
7	diquat (Reward)	2 L		1 qt/a	B		102	15.0	20.0
	nonionic surfactant	100 L		0.25 % v/v	B		206	50.0	40.0
							304	35.0	10.0
							412	40.0	25.0
							Mean =	35.0	23.8
2	Marengo	0.622 SC		7.5 fl oz/a	A		110	35.0	20.0
	nonionic surfactant	100 L		0.25 % v/v	A		205	20.0	.
							303	15.0	0.0
							404	25.0	10.0
							Mean =	23.8	10.0
8	Marengo	0.622 SC		7.5 fl oz/a	B		107	2.0	0.0
	diquat (Reward)	2 L		1 qt/a	B		201	20.0	5.0
	nonionic surfactant	100 L		0.25 % v/v	B		302	5.0	0.0
							406	10.0	5.0
							Mean =	9.3	2.5
3	Marengo	0.622 SC		15 fl oz/a	A		104	30.0	30.0
	nonionic surfactant	100 L		0.25 % v/v	A		208	60.0	25.0
							310	7.0	2.0
							405	55.0	40.0
							Mean =	38.0	24.3
9	Marengo	0.622 SC		15 fl oz/a	B		103	20.0	2.0
	diquat (Reward)	2 L		1 qt/a	B		212	40.0	20.0
	nonionic surfactant	100 L		0.25 % v/v	B		307	30.0	20.0
							401	15.0	5.0
							Mean =	26.3	11.8
4	Sureguard	51 DF		10 oz wt/a	A		111	10.0	25.0
	nonionic surfactant	100 L		0.25 % v/v	A		202	5.0	3.0
							311	35.0	30.0
							409	15.0	.
							Mean =	16.3	19.3

North Carolina State University

Pest Type								W Weed	W Weed
Pest Name								NOSTOC	NOSTOC
Description									
Rating Date								08/20/15	09/17/15
Rating Data Type								AREA	AREA
Rating Unit								%	%
Days After First/Last Applic.								28 28	56 56
Trt-Eval Interval								28 DA-A	56 DA-A
Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Unit Unit	Appl Code	Plot	1	4
10	Sureguard	51	DF	10	oz wt/a	B	105	35.0	40.0
	diquat (Reward)	2	L	1	qt/a	B	203	1.0	.
	nonionic surfactant	100	L	0.25	% v/v	B	308	50.0	40.0
							403	60.0	50.0
							Mean =	36.5	43.3
5	Diuron (Direx)	4	L	2	qt/a	A	101	0.0	0.0
	nonionic surfactant	100	L	0.25	% v/v	A	207	2.0	0.0
							305	0.0	0.0
							411	0.0	.
							Mean =	0.5	0.0
11	Diuron (Direx)	4	L	2	qt/a	B	112	2.0	0.0
	diquat (Reward)	2	L	1	qt/a	B	209	1.0	0.0
	nonionic surfactant	100	L	0.25	% v/v	B	306	0.0	0.0
							410	0.0	.
							Mean =	0.8	0.0
6	simazine (Princep)	4	L	2	qt/a	A	109	1.0	0.0
	nonionic surfactant	100	L	0.25	% v/v	A	204	1.0	.
							309	20.0	5.0
							407	0.0	0.0
							Mean =	5.5	1.7
12	simazine (Princep)	4	L	2	qt/a	B	106	0.0	0.0
	diquat (Reward)	2	L	1	qt/a	B	211	3.0	0.0
	nonionic surfactant	100	L	0.25	% v/v	B	312	5.0	0.0
							402	3.0	5.0
							Mean =	2.8	1.3

*Nursery staff had moved plants from some areas. In this process they disrupted the nostoc areas and shut off irrigation in others, affecting the noxtoc populations. Plots affected by this were omitted from the "adjusted analysis".