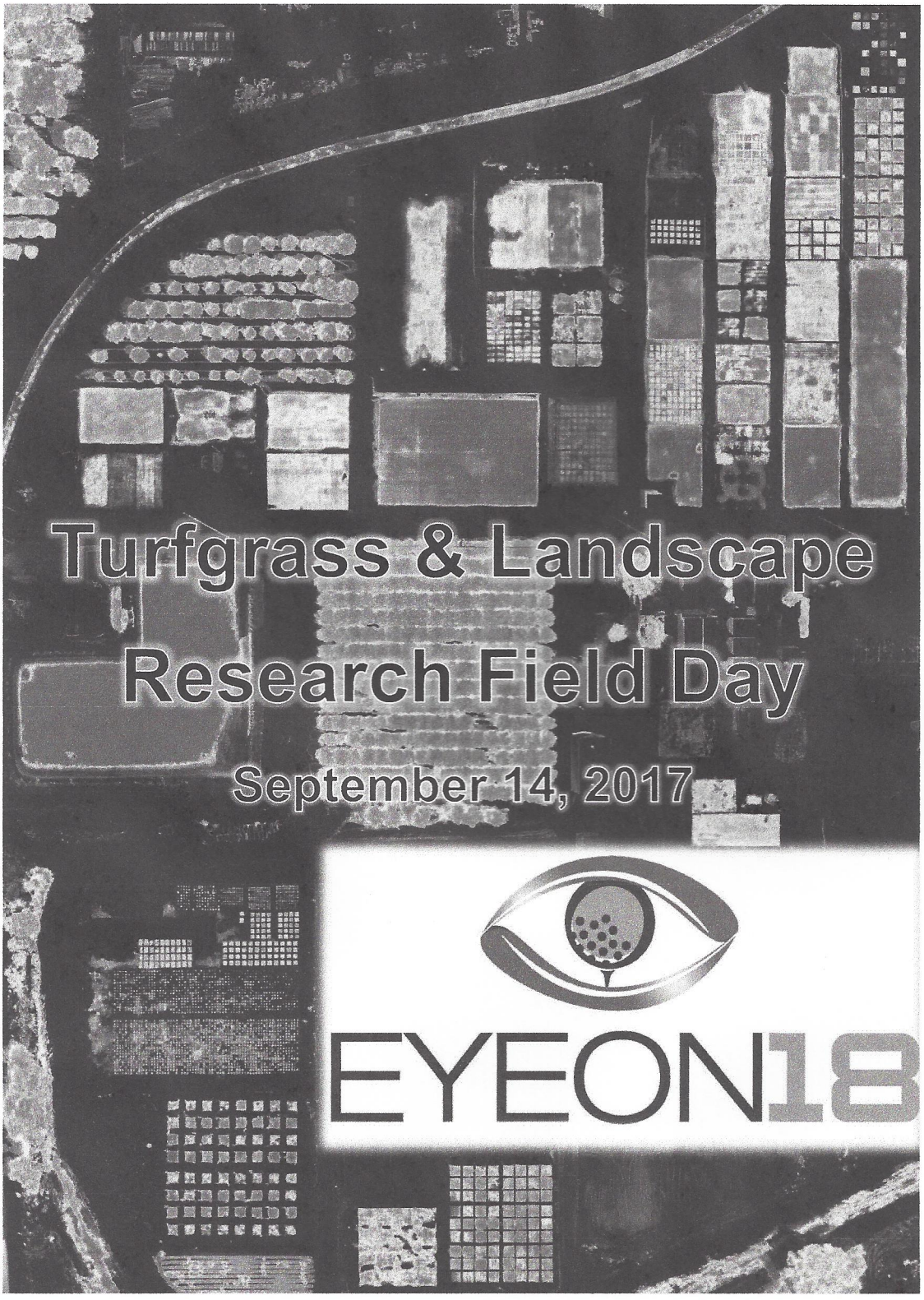

University of California Agriculture and Natural Resources

UC RIVERSIDE UNIVERSITY OF CALIFORNIA
Turfgrass Science

CA TURFGRASS & LANDSCAPE FOUNDATION
"Keeping California Green and Growing"

UNIVERSITY OF CALIFORNIA
UC RIVERSIDE

College of Natural and Agricultural Sciences
UC Division of Agriculture and Natural Resources
Agricultural Experiment Station and Cooperative Extension

Department of Botany and Plant Sciences-072
Riverside, CA 92521-0124

Welcome to Field Day!

On behalf of the entire UCR Turfgrass and Landscape Team, welcome (back) to the 2017 UCR Turfgrass and Landscape Research Field Day. This marks the 10th consecutive year of this event under my watch. Time flies when you're having fun! We continue to strive to make Field Day one of the pinnacle events of our industry – a place where all come together annually to see old friends, share ideas, and learn about world-class research activities at UCR.

While most of the State was fortunate to get some relief from the drought with rain and snowfall last winter, this summer felt like one of the hottest and certainly most humid in recent memory. Provided no unforeseen rain events between the time of writing this and Field Day, you will witness a lot turf under stress today caused by heat, drought, deficit irrigation, and pathogens, just to name a few. Today, you will see and hear about cutting edge new and longstanding research that addresses turfgrass selection, pest, water, and salinity management issues to help mitigate these stresses on turf and landscape plants. For the sixth consecutive year, we welcome several of our industry partners under the Exhibitor's Tent. Please take the time to visit them and learn more about new products and services while enjoying complimentary food and beverages. Last but not least, while this handout serves to give you a brief synopsis of our current research activities for the research tours, you can read or print our full research reports in their entirety from our website, **turfgrass.ucr.edu**.

We are happy to report that our turf team is growing to help meet the needs of the largest and most vibrant turfgrass industry in the country, if not the world. Thanks to a generous gift by Mr. John Foster, President and Founder of West Coast Turf, Dr. Marco Schiavon has assumed a new position as Assistant Researcher focusing on turfgrass water and salinity management issues. Furthermore, Dr. Marta Pudzianowska and Dr. Pawel Petelewicz have joined our team as new post-docs in turfgrass breeding and pest management, respectively.

As you enjoy today's tours, please take a moment to thank those folks, mostly wearing fuchsia shirts with our Turfgrass Science logo, who assisted with preparation for this event. Special thanks go to my fellow Field Day planning committee members including Peggy Mauk, Sue Lee, Steve Ries, Sherry Cooper, Lauren McNees, Saundra Wais, and Kellie McFarland. Production of this publication, signs, and online reports would not have been possible without assistance from Mr. Toan Khuong (Associate Specialist). Staff and students from UCANR, Agricultural Operations and my lab have worked tirelessly to make this event possible and are deserved of your appreciation. Last but not least, very special thanks to all of our industry partners for their generous donations to our turf and landscape programs throughout the year, and especially for today's delicious food and beverages under the shade of tents!

Enjoy Field Day! And we hope to see you again next year on **Thursday, September 13, 2018.**

Sincerely,

James H. Baird, Ph.D.
Associate Specialist in Cooperative Extension and Turfgrass Science

CIMIS Data Sep. 2016 – Aug. 2017

Los Angeles Basin-U.C. Riverside - #44

Month Year	Tot ETo (in)	Tot Precip (in)	Avg Sol Rad (Ly/day)	Avg Vap Pres (mBars)	Avg Max Air Tmp (F)	Avg Min Air Tmp (F)	Avg Air Tmp (F)	Avg Max Rel Hum (%)	Avg Min Rel Hum (%)	Avg Rel Hum (%)	Avg Dew Point (F)	Avg Wind Speed (mph)	Avg Soil Temp (F)
Sep 2016	5.30	0	431	12.6 K	87.9 K	60.8	72.9	71	27	47 K	50.1 K	4.0 K	71.5
Oct 2016	3.87 K	0.87 K	329 K	11.2 K	80.7 K	56.6 K	67.7 K	70 L	31 L	51 L	45.9 L	3.5 K	66.4 K
Nov 2016	3.18	1.06	271	7.3	76.2	50.2 K	62.2 K	61	22	40 K	35.1 K	3.7 K	59.7
Dec 2016	1.99	3.65	192	7.8 K	64.2	45.1 K	54.1	73	37	54 K	35.8 K	3.8 K	52.9
Jan 2017	1.81	4.56	201	8.2 K	61.3	44.3	52.4	77	46	62 K	38.2 K	3.6 K	52.4
Feb 2017	2.08	2.14	254	9.8 K	64.9	47.2	55.3	82	46	65 K	43.3 K	3.3	56.3
Mar 2017	5.01	0.15	436	8.6	76.7 K	50.0 K	62.4 K	69	25	45 K	39.7 K	4.0 K	61.2
Apr 2017	6.13	0.04	535 K	9.6 K	77.8	51.1 K	64.6	75	27	47 K	42.6 K	4.7 K	65.1
May 2017	5.95	0.06	534	12.9	78.5	54.4 L	65.6	86	40	62	50.8	4.6 K	68.6
Jun 2017	6.98	0	613	16 K	88.8 K	60.5 K	73.5	88	34	59 K	56.9 K	4.3	74.5
Jul 2017	7.11	0.03	569	18.7 K	93.8 K	65.7 K	78.5	87	33	57 K	61.4 K	4.0 K	78.6 K
Aug 2017	6.4 K	0.39	523	19.8 K	93 K	65.7 K	77.5	93	35	61 L	62.1 L	4.0 K	78.1
Totals/Avgs	55.81	12.95	407	11.9	78.7	54.3	65.6	78	34	54	47	4.0	65.4

M – All Daily Values Missing	K – One or More Daily Values Flagged
J – One or More Daily Values Missing	L – Missing and Flagged Daily Values

$W/m^2 = 2.065$ Ly/day	25.4 mm = inch	C = 5/9 * (F -32)
m/s = 2.24 mph		kPa = 10 mBars

2017 Turfgrass and Landscape Research Field Day Agenda

7:00 AM	**Exhibitor set-up**
7:30-8:30 AM	**Registration and Trade Show**
8:30 AM	**Welcome and Introductions** Peggy Mauk and Jim Baird
8:40-10:00 AM	**Field Tour Rotation #1** (20 minutes per station)
Stop #1 *Gold Tent*:	**Improvement of Bermudagrass, Kikuyugrass, and Zoysiagrass for Winter Color Retention and Drought Tolerance** Adam Lukaszewski and Marta Pudzianowska
Stop #2 *Red Tent*:	**USGA/NTEP Cool-Season Water Use Trial** Marco Schiavon and Antonio Verzotto
Stop #3 *Green Tent*:	**Evaluation of Fungicides for Control of Anthracnose and Summer Patch Diseases on Annual Bluegrass Putting Greens** Jim Baird
Stop #4 *Blue Tent*:	**Evaluation of Fertilizer Products and Formulations on Bermudagrass Turf; Selective Oxalis Control in Bermudagrass Turf** Pawel Petelewicz
10:00 – 10:30 AM	**Break and Trade Show**
	Biology and Control of Sting and Pacific Gall Nematodes Ole Becker
10:30 – 11:50 AM	**Field Tour Rotation #2** (20 minutes per station)
Stop #5 *Gold Tent*:	**Management of Salinity and Rapid Blight Disease on Annual Bluegrass Putting Greens** Jim Baird
Stop #6 *Red Tent*:	**Best Management Practices for Kurapia Groundcover** Pawel Orlinski
Stop #7 *Green Tent*:	**Remote Sensing and Evapotranspiration (ET) Replacement Strategies for Turf Irrigation; Evaluation of Plant Growth Regulators (PGRs) on Bermudagrass and Seashore Paspalum Turf** Pawel Petelewicz and Jose Espeleta
Stop #8 *Blue Tent*:	**Best Management Practices for Water Conservation on Bermudagrass Turf; How Often Should You Water Your Lawn?** Marco Schiavon and Antonio Verzotto
12:00 – 1:30 PM	**Barbeque Lunch and Trade Show**
1:30 PM	**Adjourn**

Please go on-line and fill out the evaluation form at http://ucanr.edu/turf2017eval.

Kurapia Groundcover Frequently Asked Questions

What is Kurapia?

Kurapia [*Phyla (Lippia) nodiflora*) is a low growing, herbaceous, perennial dicot groundcover belonging to the Verbenaceae or Verbena family. Although the species is either native or naturalized to California, Kurapia is a sterile, non-invasive, cultivar from Japan, which is propagated vegetatively by plugs or creeping stems (stolons) only. Kurapia's dense canopy and deep root system provide excellent drought tolerance and soil stabilization even on steep slopes. It is also tolerant of a wide range of soil conditions including salinity, but generally prefers sandy, well-drained soils. Kurapia reaches a maximum height of 3 to 6 inches and produces numerous small, white flowers from spring to late summer. As a result, mowing is not required. However, regular mowing with a rotary or reel mower as low as 2 inches can be used to minimize flowering. Kurapia can tolerate partial shade and light traffic when maintained either non-mowed or mowed similar to a lawn; however, it is not recommended for use under intensive, concentrated traffic. Kurapia is adapted to climate zones of 7b and higher. In regions where average daily temperatures remain above 45 °F, Kurapia will stay evergreen; however, growth will gradually decrease and enter dormancy when average daily temperatures fall to around 38 °F. Kurapia has been known to survive temperatures as low as 13 °F. These temperatures are provided as estimates, as Kurapia greenness, dormancy, and survival will depend upon specific location and environmental factors.

Where can I buy Kurapia?

Kurapia can be purchased as plugs or sod.

Plugs:

Florasource, Ltd.
P.O. Box 758 San Clemente, CA 92674
Tel: 949-498-1131
http://www.kurapiaplugs.com/

EcoTech Services, Inc
2143 S. Myrtle Ave., Monrovia, CA 91016
Tel 626-788-5652
http://www.kurapiadirect.com/

EcoLawn S. B.
2409 Calle Soria
Santa Barbara, CA 93109
Tel: 805-270-2960
http://ecolawnsb.com/
Limited to Santa Barbara County only.

Sod:
West Coast Turf
PO Box 4563
Palm Desert, CA 92261
Tel: 760-340-7300
https://www.westcoastturf.com/Kurapia-Drought-Tolerant-Ground-Cover

Delta Bluegrass Company
PO Box 307, Stockton, CA 95201
Tel: 209-969-4679
http://www.deltabluegrass.com/kurapia-new

Are different cultivars available?
Currently, only one cultivar is commercially available; however, additional cultivars, one that produces pink flowers and another with greater cold tolerance, will be available soon.

How much water does Kurapia need?
Kurapia has similar water requirements as most warm-season turfgrasses (i.e., approx. 50-60% replacement of evapotranspiration (ET). Once established, Kurapia will survive with even less water depending on aesthetic preference, requiring irrigation once a week or longer depending on temperature and ET. In general, Kurapia does not like wet feet. In other words, avoid excessive irrigation. On the other hand, establishment of Kurapia or any drought tolerant plant species is not the time to withhold water. Thus light, frequent irrigation is warranted during the establishment period.

Is Kurapia susceptible to diseases?
In general, California's climate is not conducive to frequent disease activity. However, occasionally the combination of heat and humidity coupled with frequent or heavy irrigation can incite various soil-borne fungal diseases in Kurapia including southern blight and *Pythium*. The best prevention is to avoid over irrigation, especially when Kurapia establishes into a dense canopy. If a fungicide application is needed, a product like Heritage (azoxystrobin) fungicide should provide effective disease control.

How do I control weeds in Kurapia?
In general, weeds are best controlled preventatively using preemergence herbicides like prodiamine, metolachlor, or pronamide at planting or in August-September (winter annuals) and January-February (summer annuals). Sedge (and some broadleaf and grass weeds) can be controlled using halosulfuron, sulfosulfuron, or trifloxysulfuron on mature Kurapia; however, Kurapia disruption of flower production and foliar injury can be expected. Postemergence broadleaf weed control is challenging given that Kurapia is a broadleaf species. Three-way mixes containing 2,4-D, MCPP, and dicamba will cause considerable injury to Kurapia flowers and foliage, but the groundcover will recover in time. Postemergence grass control can be achieved with products containing fluazifop or sethoxydim.

Stop #6: Kurapia Groundcover Tolerance to Homeowner Accessible Herbicides

Pawel Orlinski and Jim Baird
Department of Botany and Plant Sciences
University of California, Riverside, CA 92521

Objectives:

Kurapia tolerance to various herbicides has been tested by UCR and the University of Arizona Cooperative Extension. In general, the best and safest weed control in this groundcover is accomplished using preemergence herbicides, specifically metolachlor (e.g., Pennant Magnum), prodiamine (e.g., Barricade), pronamide (e.g., Kerb). This study focused on evaluating products and active ingredients that are accessible to homeowners.

Materials and Methods:

Nine different herbicides were tested on mature Kurapia established in 2015. Soil was a Hanford fine sandy loam. Treatment list is presented in Table 1. Herbicides were applied using a CO_2-powered backpack sprayer with TeeJet 8002VS nozzles calibrated to deliver 1 gal/1000 ft^2. Herbicides were mixed at the 1/2x rate and sprayed 1, 2 (x rate), or 3 (1.5x rate) times representing 3 separate treatments. In the case of Sedge Killer and Sedgehammer+, which are pre-mixtures, treatments were sprayed 1 (x rate), 2 (2x rate), or 3 (3x rate) times. Experimental design was a randomized block with 3 replications. Plot size was 4 ft x 6 ft with 4-ft alleys. Plots were evaluated for flowering (%), green cover (%) and injury (%). Ratings were made at 0, 4, 6, and 8 days after treatment (DAT) before publication of this report.

Results:

Herbicide used was statistically significant in case of all measured traits whereas number of passes over plots was not. Gradual changes of evaluated parameters were observed over time. Almost all of herbicides except for Grass Getter and Fusilade II caused loss of flowers compared to control within 4 DAT. Two of the herbicides lead to browning and loss in green color of plants (Nutsedge Killer and Roundup for Lawns). Both WeedBGone herbicides (Weed Killer and Crabgrass Control) caused yellowing of the plants. Among sedge herbicides only Sedgehammer+ and Monument caused complete loss of flowers with no other effects within 8 DAT. Results are presented in Table 2.

Preliminary results suggest that products containing sulfentrazone are too injurious to Kurapia and thus are not recommended. For grass control, products containing fluazifop or sethoxydim are very safe on Kurapia. For sedge control, it is too early to tell which is safest among Sedgehammer, Certainty, and Monument. An earlier study conducted on newly established Kurapia at UCR found that Sedgehammer was more injurious than

Certainty; however, researchers at the University of Arizona found that both Sedgehammer and Certainty were safe on Kurapia that was likely more established compared to our earlier trial.

Table 1. List of treatments applied in the Kurapia herbicide tolerance study. Riverside, CA. 2017.

Treatment number	Herbicide	Active ingredient(s)	Rate
1	Control	-	-
2	Roundup for Lawns	MCPA + Quinclorac + Dicamba + Sulfentrazone	0.5 x
3			x = 6.4 oz/M
4			1.5 x
5	WeedBGone Weed Killer	Dicamba + 2,4-D + Mecoprop-p	0.5 x
6			x = 4 oz/M
7			1.5 x
8	WeedBGone Crabgrass Control	Quinclorac + Dicamba + 2,4-D	0.5 x
9			x = 6.4 oz/M
10			1.5 x
11	Nutsedge Killer	Sulfentrazone	x = Premix
12			2 x
13			3 x
14	Sedgehammer+	Halosulfuron-methyl	x = 0.5 oz/M
15			2 x
16			3 x
17	Certainty + NIS 0.25% v/v	Sulfosulfuron	0.5 x
18			x = 0.75 oz/A
19			1.5 x
20	Monument + NIS 0.25% v/v	Trifloxysulfuron sodium	0.5 x
21			x = 10 g/A
22			1.5 x
23	Grass Getter + MSO 0.25% v/v	Sethoxydim	0.5 x
24			x = 0.6 oz/M
25			1.5 x
26	Fusilade II + NIS 0.25% v/v	Fluazifop-P-butyl	0.5 x
27			x =24 oz/A
28			1.5 x

NIS – Non-ionic surfactant; MSO – Methylated seed oil

Table 2. Effects of herbicides on flowering, green cover, and injury of Kurapia plants. Riverside, CA. 2017.

Herbicide	Rate	Flowering %			Green cover %			Visual injury %		
		0 DAT	4 DAT	8 DAT	0 DAT	4 DAT	8 DAT	0 DAT	4 DAT	8 DAT
Control	0	93 ab	95 a	97 a	97 a	98 a	100 a	0 a	0 a	0 a
Roundup for Lawns	0.5x	65	0	0	98	77	80	0	23	14
	1x	70 ab	0 c	0 c	98 a	72 b	63 b	2 a	28 d	21 cd
	1.5x	56	0	0	100	42	35	0	62	48
WeedBGone Weed Killer	0.5x	90	0	0	100	98	100	1	2	8
	1x	85 a	0 c	0 c	100 a	98 a	80 a	0 a	7 ab	20 bc
	1.5x	88	0	0	100	100	82	0	10	26
WeedBGone Crabgrass Control	0.5x	67	0	0	98	100	92	0	3	13
	1x	77 a	0 c	0 c	98 a	100 a	93 a	0 a	0 ab	10 ab
	1.5x	100	0	0	100	99	100	0	1	6
Nutsedge Killer	1x	65	2	0	95	25	17	0	68	74
	2x	70 ab	1 c	0 c	100 a	4 c	5 c	0 a	64 e	94 e
	3x	78	0	0	100	8	3	0	92	94
Sedgehammer +	1x	70	41	0	95	96	100	0	2	1
	2x	67 ab	16 c	0 c	99 a	100 a	100 a	1 a	0 a	0 a
	3x	60	7	0	98	97	96	0	0	0
Certainty	0.5x	53	19	13	100	100	98	0	0	0
	1x	88 a	53 bc	4 c	98 a	97 a	98 a	0 a	0 a	0 a
	1.5x	88	40	2	100	98	99	0	2	0
Monument	0.5x	87	28	0	100	100	100	0	0	0
	1x	62 ab	19 c	0 c	100 a	100 a	100 a	0 a	0 a	1 a
	1.5x	63	7	0	100	97	100	0	0	1
Grass Getter	0.5x	68	58	87	98	100	100	0	0	0
	1x	72 a	77 ab	98 a	98 a	98 a	100 a	0 a	0 a	0 a
	1.5x	95	97	98	100	100	100	0	0	0
Fusilade II	0.5x	53	60	72	100	100	100	0	0	0
	1x	90 ab	88 ab	99 a	100 a	100 a	100 a	0 a	0 a	0 a
	1.5x	67	66	72	100	98	97	0	2	1

Means followed by the same letter for a trait (e.g., flowering %) are not significantly different (P=0.05).