Kurapia (*Lippia nodiflora L*) Performance in the Low Desert Arizona

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Background

There is greater interest for landscapes in the low desert regions of Arizona to seek alternative groundcovers that have low input requirements for irrigation, fertilizers, and less frequent mowing. Kurapia (Lippia nodiflora) is a sterile cultivated variety of groundcover from Japan that has been recently evaluated in California where it appeared promising for its low water use and salinity tolerance characteristics (Figure 1). Under Arizona's arid desert conditions there is no research-based information about the establishment and performance of Kurapia and its tolerance to preemergence and postemergence herbicides.

- Name: *Lippia nodiflora* L. 'Kurapia'
- Bred: Cultivar of *Lippia nodiflora* (syn. *Phyla nodiflora*)
- Common Name: Kurapia
- Plant Type: Perennial
- Growth Habit: Prostrate
- Flowers: Small, White, May to November
- Height: Low growing, less than 3" high
- Width: Spreading to 6 feet
- Exposure: Full sun to part shade
- Drought Tolerant: ETo 20% by drip irrigation (UC-Davis)
- and ETo 40% by sprinkler irrigation (UC-Davis)
- pH Tolerant: pH 4-9 (UC-Riverside)
- Salinity Tolerant: Up to EC 7ds/m
- Temperature: 13-120°F
- USDA Hardiness Zones: 7b-13b
- Sterile, doesn't produce viable seed
- Non-invasive as screened by UC Davis

Figure 1. Kurapia characteristics

Objectives

To evaluate the adaptation and performance of Kurapia and its response to cultural management practices in non-play areas of golf courses; and to identify herbicides that could be used safely to establish weed-free Kurapia.

Materials and Methods

A multi-year Kurapia establishment and performance study is being conducted in Scottsdale, Arizona under sprinkler irrigation. In March 2015, Kurapia plugs were initially planted and grown under a deficient irrigation system that was less than daily optimum (equivalent of 6 mm/day). Eight preemergence herbicides were applied immediately after planting and twelve postemergence herbicides were applied at 15 weeks after planting (Table 1) as two experiments in a randomized complete block design with three replications. Herbicides were applied to Kurapia using a backpack CO_2 sprayer equipped with a hand-held boom with two 8003LP flat-fan nozzles spaced 51-cm apart. In November 2015, a second experiment was installed to evaluate Kurapia plug spacing and growth rates on 30.5 cm and 45.7 cm centers with equivalent of 4 mm/day irrigation. In May 2016, Kurapia plugs were planted under optimum sprinkler irrigation (equivalent of 9 mm/day) to observe and compare the overall performance of Kurapia. Evaluations were done weekly and data collected for plug survival, growth rate, flowering, visual estimates of herbicide safety, and aesthetic value.

Table 1. Preemergence (PRE) and postemergence (POST) herbicides evaluated for safety on Kurapia in Scottsdale, Arizona in 2015

Product	Active Ingredient	Timing and Target Weeds	Kg a.i.ha^{-1}
Sureguard	flumioxazin	PRE broadleaf	0.28
Ronstar G	oxadiazon	PRE broadleaf, grasses	4.48
Pendulum	pendimethalin	PRE grasses	4.48
Specticle FLO	indaziflam	PRE broadleaf	0.05
Tower	dimethenamid	PRE grasses, broadleaf	1.68
Gallery	isoxaben	PRE broadleaf	1.12
Barricade 65WG	prodiamine	PRE grasses	1.68
Kerb SC	pronamide	PRE winter annuals	1.40
Tribute Total	halosulfuron + foramsulfuron + thiencarbazone-	POST grass/broad/sedge	0.18
Trimec 1000	2,4-D + MCPP + dicamba	POST broadleaf	1.83
Speedzone Southern	carfentrazone + 2,4-D + MCPP + dicamba	POST broadleaf	0.45
Celsius	iodosulfuron +dicamba + thiencarbazone	POST broad/grass	0.29
Lontrel	clopyralid	POST broadleaf	0.56
Vista	fluroxypyr	POST broadleaf	0.
Fusilade II	fluazifop	POST grass	0.41
Sedgehammer	halosulfuron	POST sedge	0.07
Certainty	sulfosulfuron	POST grass/broad/sedge	0.07
Tenacity	mesotrione	POST grass/broad	0.22
Drive XLR8	quinclorac	POST broad/grass	0.84
Dismiss	sulfentrazone	POST broadleaf/grass/sedge	0.42

Results and Discussion

Survival rate, growth, flowering, and response to cultural management practices: Kurapia exhibited a 90 - 100% survival rate of the planted plugs when planted either in the spring or fall. Lateral plant growth from a plug was as great as 1 meter. Kurapia provided complete ground cover within 6 weeks during the late spring when there was optimal daily multiple irrigation as compared to 12 weeks under a deficient irrigation system and 24 weeks during winter (Figure 2). Optimum water availability was critical for Kurapia establishment as demonstrated by the daily multiple irrigation versus the less than daily irrigation scheduling. Kurapia establishment and early growth was not tolerant of drought and low water conditions. Long-season flowering occurred from May to October and attracted many pollinators, especially when Kurapia was not mowed (Figure 3). Mowing reduced lateral stems and provided attractive green mat appearance (Figure 3B). Plug spacing at 30.5 cm or 45.7 cm had little effect on the performance and fill-in time of Kurapia over the ground (Figure 4).

Preemergence herbicides results: The least injurious were Kerb SC, Gallery, and Barricade 65WG while Sureguard and Ronstar G were the most injurious preemergence herbicides when applied immediately after transplanting Kurapia plugs (Figure 5).

Postemergence herbicides results: At 6 weeks after postemergence herbicide applications (WAT), Fusilade II, Sedgehammer, and Lontrel caused less than 20% injury, while Dismiss killed all the plants; Trimec 1000, Vista, and Drive caused severe unacceptable injury (Figure 6). Tenacity injured Kurapia 20 - 30% and caused foliar bleaching (Figure 7). Celsius, Tribute, Certainty, and SpeedZone caused moderate injury and the Kurapia recovered to provide groundcover.

Figure 2. Kurapia performance at 4 weeks (A, B, C) and 8 weeks (D, E, F) after planting during spring and fall.

Figure 2B. Kurapia performance at different times of planting

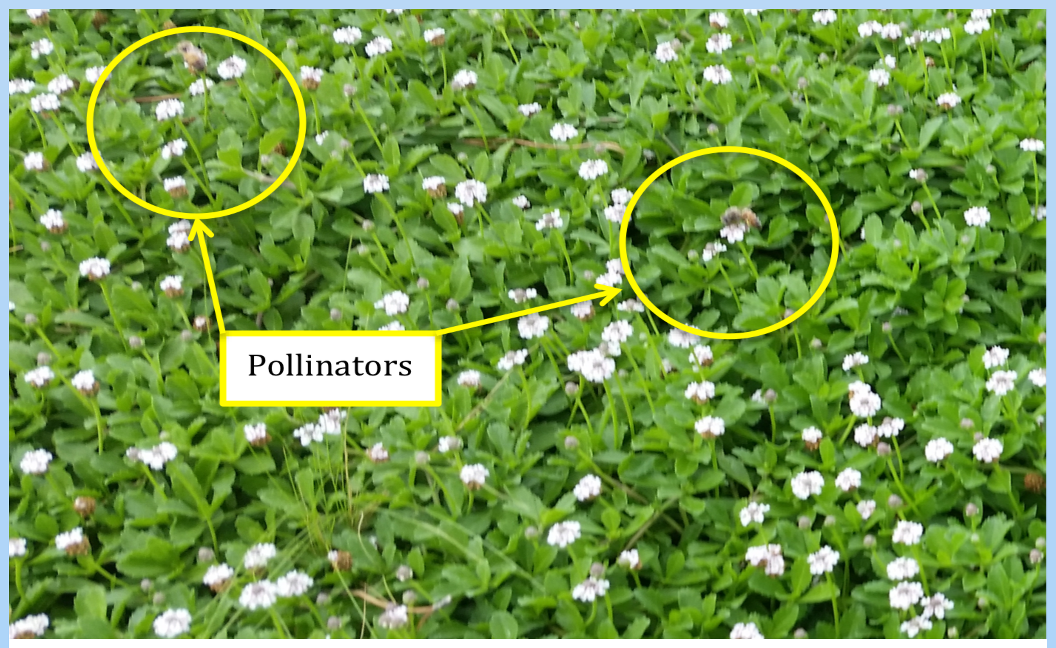

Figure 3. Kurapia flowers attractive to pollinators

Figure 3B. Kurapia performance and appearance after mowing at different heights of cut.

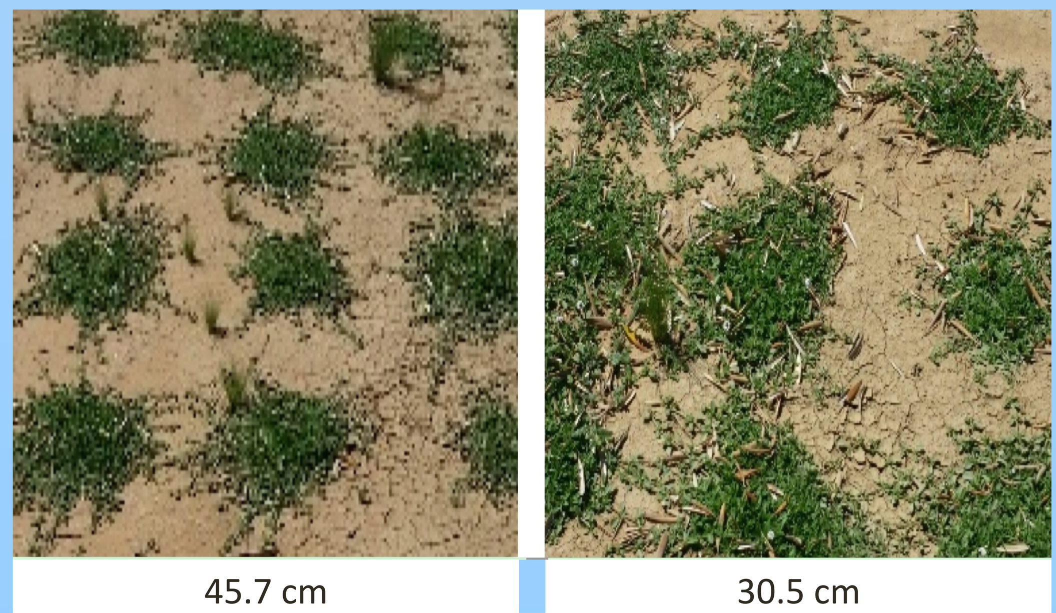

Figure 4. Kurapia growth rates at different plant spacings

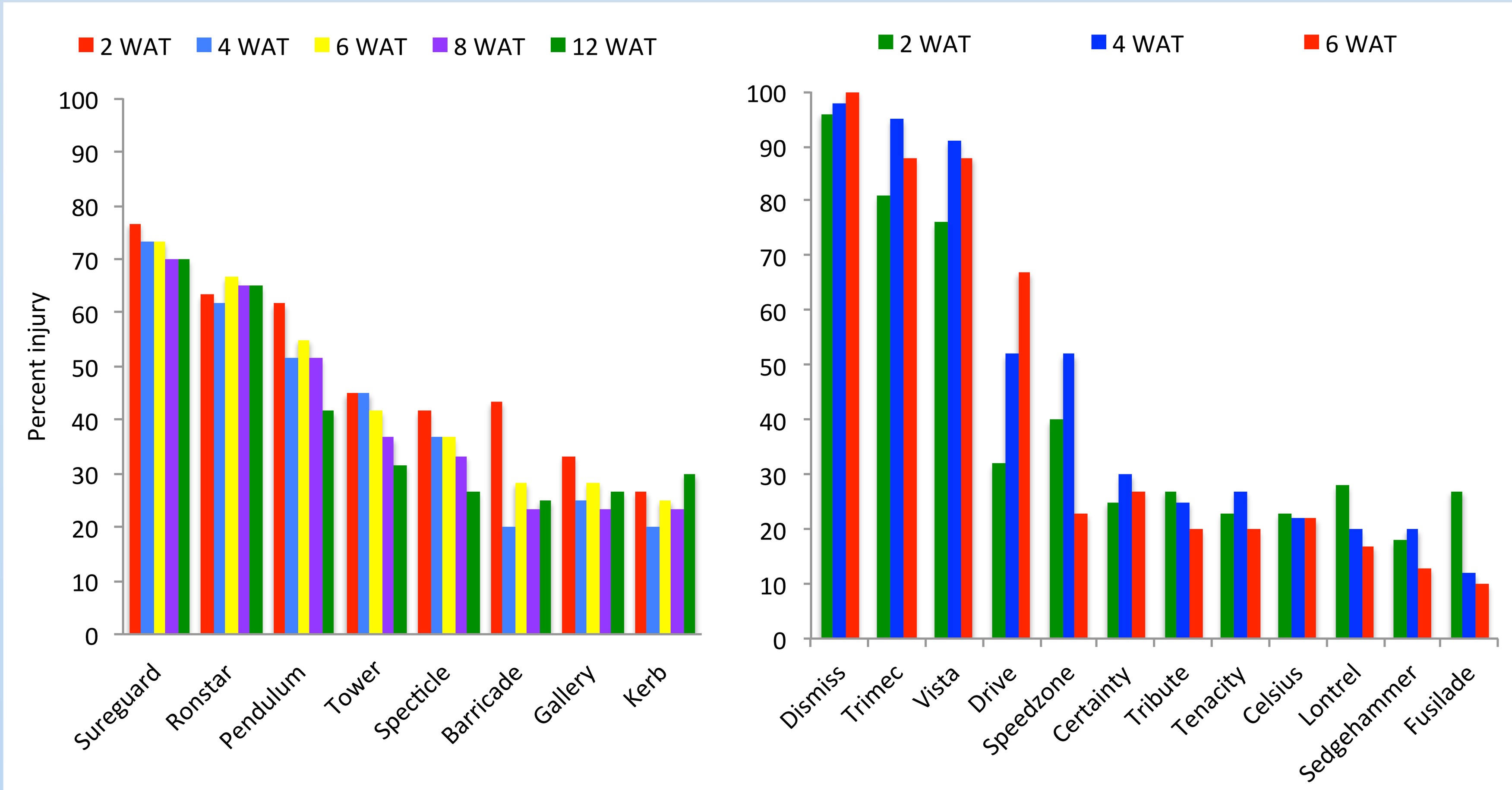

Figure 5. Effect of preemergence (left) and postemergence (right) herbicides on Kurapia establishment

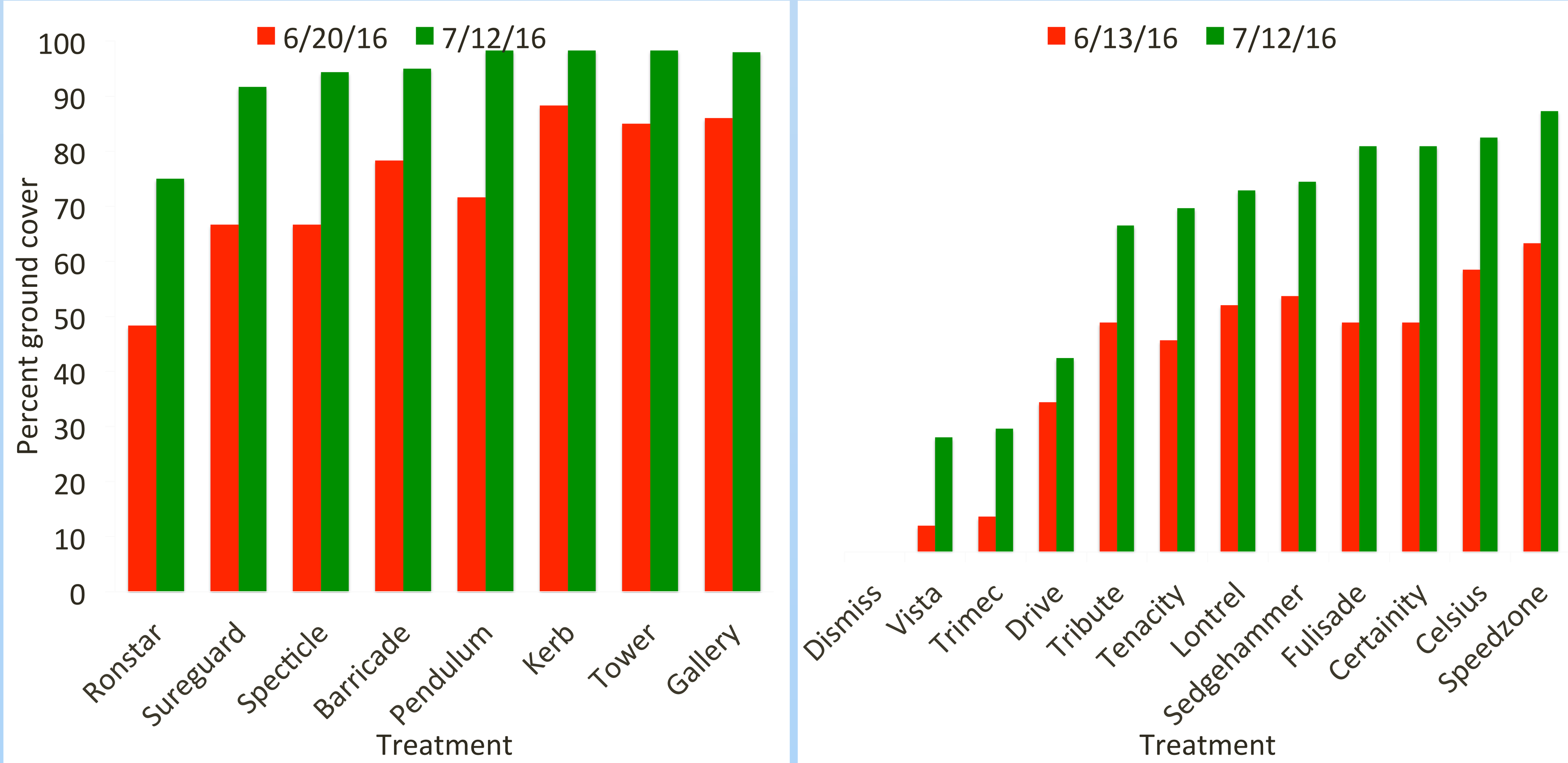

Figure 5B. Effect of preemergence (left) and postemergence herbicides on Kurapia percent groundcover

Figure 6. Relatively safer (left three) and injurious (right three) postemergence herbicides to Kurapia

Figure 7. Tenacity caused chlorosis and foliar bleaching to Kurapia. WAT-Weeks after treatment.

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