GORDON'S ProForm PROFESSIONAL FORMULATIONS®

Katana® TURF HERBICIDE

Technical Bulletin

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Introduction

Katana® Turf Herbicide (flazasulfuron) is an innovative herbicide which controls kyllingas, sedges, and grassy and broadleaf weeds with post-emergence and some pre-emergence activity. Highly selective in bermuda, zoysia, centipede and buffalo grasses and seashore paspalum, Katana is an excellent product for removal of overseeded cool-season grasses.

University trials prove Katana excels in controlling ryegrass, clumpy ryegrass, *Poa annua*, *Poa trivialis*, tall fescue and annual ryegrass in warm-season turf. For improved control of *Poa annua*, it can be used at reduced rates when applied in conjunction with urea nitrogen. The nitrogen should be in the form of urea 46-0-0.

Katana is labeled for control of 55 sedges and grassy and broadleaf weeds. With a much broader spectrum of control of grassy and broadleaf weeds than other products of its type, this makes it an excellent option for golf and commercial landscape maintenance in warm-season turf. Katana is effective at very low rates and is absorbed through both the leaves (50%) and the roots (50%).

The EPA has granted Katana reduced-risk status.

BENEFITS

- Outstanding control of kyllingas and annual sedges
- Excellent grassy weed control - clumpy ryegrass, tall fescue, *Poa annua* and *Poa trivialis*
- Controls a wide range of broadleaf weeds
- More active in cooler temperatures than competitive products
- Labeled for use on golf courses, commercial turf and sports turf
- Excellent transition properties in cooler weather (<65°F)
- Good tank-mix partner for broadleaf weed control
- Both root and foliar uptake

USE SITES

Katana can be used on golf courses (fairways, roughs and tees) and other non-residential turf areas such as industrial parks, tank farms, sod farms, seed farms, cemeteries, commercial turf and sports turf.

MODE OF ACTION

Katana controls weeds by inhibiting the acetolactate synthase (ALS) enzyme. Katana is a systemic herbicide and is absorbed by the plants through both the leaves and roots.

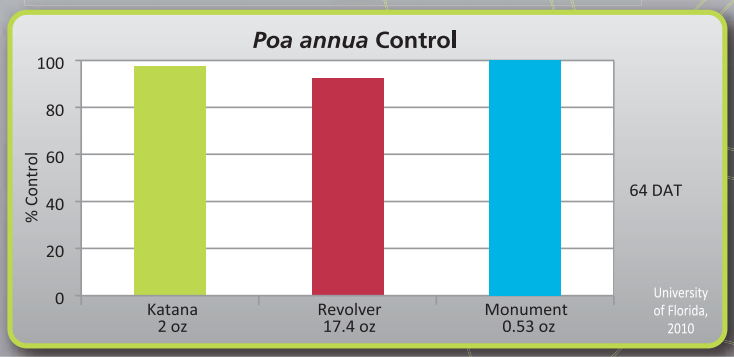
TURF TOLERANCE

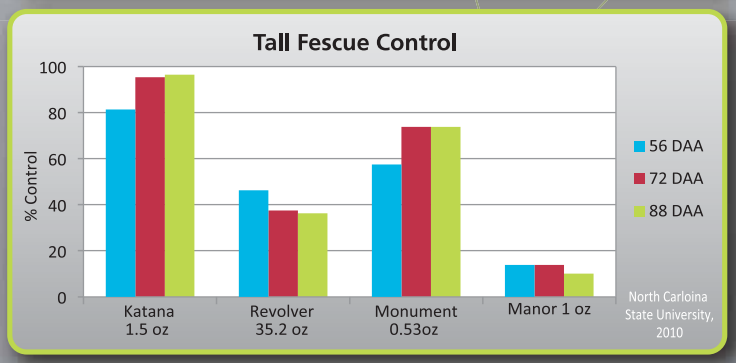
Research has shown many varieties of bermuda, zoysia, centipede and buffalo grasses and seashore paspalum are tolerant to Katana. The maximum rate on centipedegrass and seashore paspalum is 1.5 ounces per acre applied to fully green, actively growing turf. Do not apply to centipedegrass during spring or fall transition.

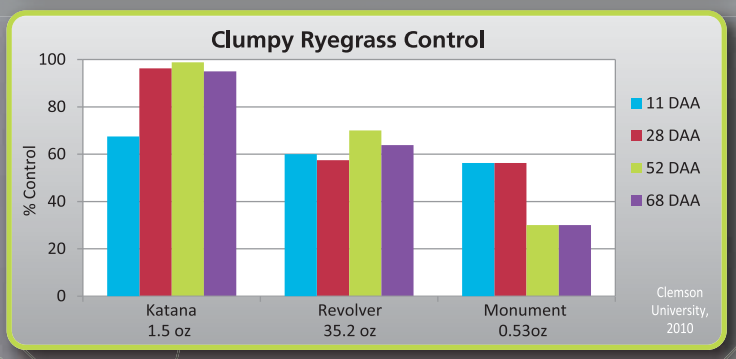
USE SEASON

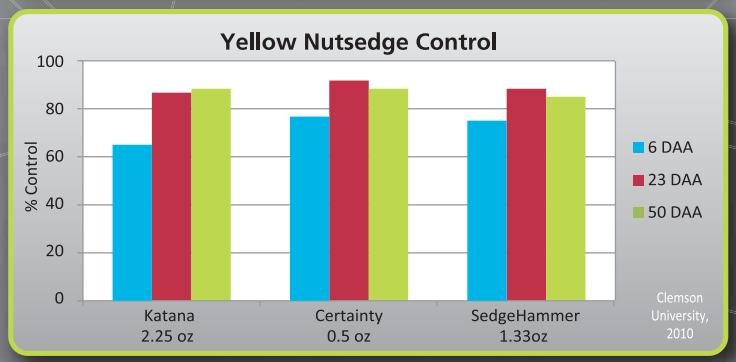
- Spring and fall *Poa* control
- Transition generally May through June
- Weed control May through September

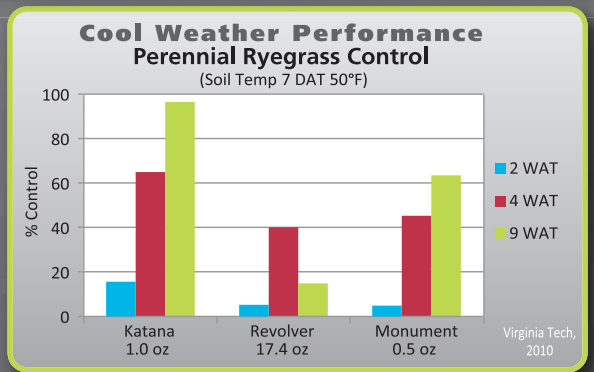
Efficacy Data



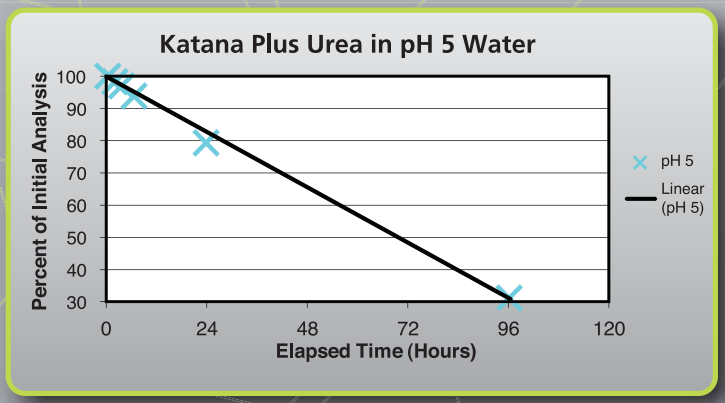


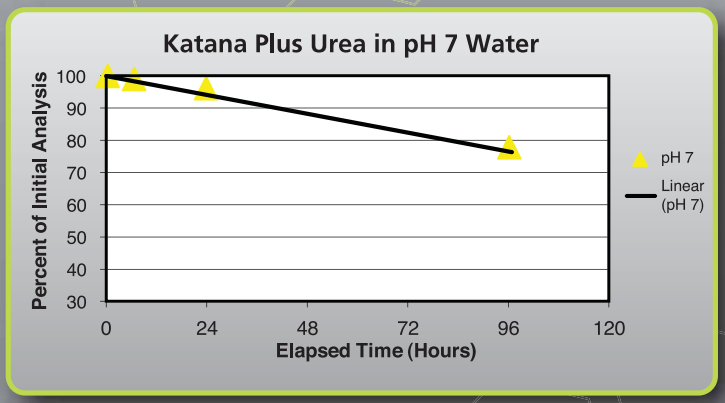


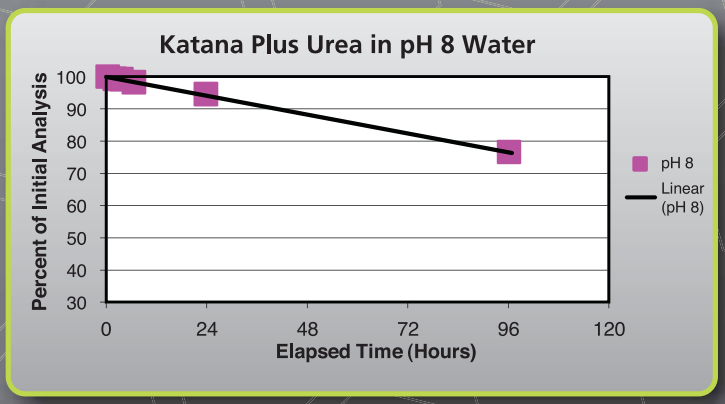




Chemical Stability







Weeds Controlled

TRANSITIONING OVERSEEDED RYEGRASS TO BERMUDAGRASS

Use Katana for a smooth transition from the over-seeded winter cover to actively growing and green bermudagrass. When bermudagrass is 50% to 60% greened up, apply Katana to remove the overseeded cool-season turf.

Removal of Volunteer Cool-Season Grasses From Listed Warm-Season Turfgrasses

Species Controlled	Product Application Rate Ounces per 1,000 sq ft	Product Application Rate Ounces per acre
Volunteer Ryegrass (Clumpy Ryegrass)	0.034 – 0.068	1.5 – 3.0
Tall Fescue	0.034	1.5

Removal of Kyllingas and Sedges From Listed Warm-Season Turfgrasses

Species Controlled	Product Application Rate Ounces per 1,000 sq ft	Product Application Rate Ounces per acre
Kyllingas (green, false-green, cocks-comb and fragrant)	0.034 – 0.051	1.5 – 2.25
Sedges* (annual, globe, and yellow nutsedge)	0.034 – 0.068	1.5 – 3.0
Sedges* (purple nutsedge, cylindric and rice flatsedge)	0.034 – 0.068	1.5 – 3.0

** Repeat applications if necessary*

Removal of Annual Bluegrass (*Poa annua*) From Listed Warm-Season Turfgrasses

Katana Turf Herbicide + ***Urea Nitrogen (46-0-0)****

Species Controlled	Product Application Rate Ounces per 1,000 sq ft	Product Application Rate Ounces per acre
Annual Bluegrass *(Poa annua)*		
Katana Turf Herbicide	0.023 to 0.034 oz.	1.0 to 1.5 oz/acre
+ Urea (46-0-0)	+ 0.54 lb - 1.63 lb of urea per 1000 sq. ft. (or 0.25 - 0.75 lb actual N)	+ 24 lbs - 71 lbs of urea per acre (or 11.0 - 33.0 lbs actual N)

**See label for complete application instructions*

Removal of Overseeded Cool-Season Turfgrass From Listed Warm-Season Turfgrasses

Species Controlled	Product Application Rate Ounces per 1,000 sq ft	Product Application Rate Ounces per acre
Perennial ryegrass	0.011 – 0.034	0.5 – 1.5
Italian (annual) ryegrass	0.034	1.5
Poa trivialis	0.051 – 0.068	2.25 – 3.0

GRASSY WEEDS Rate Recommendation Table for Weed Control

Weed Species Controlled	Product Application Rate Ounces per 1,000 sq ft	Product Application Rate Ounces per acre
Barnyardgrass	0.068	3.0
Blue-eyed grass	0.034	1.5
Bluegrass ,annual *(Poa annua)*	See specific directions	See specific directions
Bluegrass, roughstalk *(Poa trivialis)*	0.051 – 0.068	2.25 – 3.0
Crabgrass, smooth (< 4 leaf stage of growth)	0.068	3.0
Crabgrass, southern	0.034 – 0.068	1.5 – 3.0
Hard fescue	0.068	3.0
Narrow-leaf blue-eyed grass	0.034	1.5
Quackgrass	0.034	1.5
Rattail fescue	0.034 – 0.068	1.5 – 3.0
Swinegrass	0.034	1.5

Some difficult-to-control weeds may require multiple applications.

BROADLEAF WEEDS Rate Recommendation Table for Weed Control

Weed Species Controlled	Product Application Rate Ounces per 1,000 sq ft	Product Application Rate Ounces per acre
American burnweed	0.034	1.5
Black medic	0.034	1.5
Bristly mallow	0.034	1.5
Carolina geranium	0.034	1.5
Catsear dandelion	0.034 – 0.068	1.5 – 3.0
Chamberbitter	0.034 – 0.068	1.5 – 3.0
Common chickweed	0.034	1.5
Common periwinkle	0.034 - 0.068	1.5 - 3.0
Common vetch	0.034	1.5
Cutleaf eveningprimrose	0.068	3.0
Dandelion	0.068	3.0
Dogfennel	0.034	1.5
Field madder	0.068	3.0
Field pansy	0.034	1.5
Hairy bittercress	0.034	1.5
Henbit	0.034	1.5
Japanese honeysuckle	0.034	1.5
Large hop clover	0.034	1.5
Lawn burweed	0.034	1.5
Mouse-ear chickweed	0.034	1.5
Parsely-piert	0.034	1.5
Purple deadnettle	0.068	3.0
Sicklepod	0.034	1.5
Slender aster	0.034 – 0.068	1.5 – 3.0
Southwest bedstraw	0.034	1.5
Sowthistle	0.034 – 0.068	1.5 – 3.0
Spotted spurge (partial control)	0.068	3.0
Sticky chickweed	0.034	1.5
Tall fescue	0.034	1.5
Wandering cudweed	0.068	3.0
White clover	0.034 – 0.068	1.5 – 3.0
Wild Violet	0.034	1.5
Yellow rocket	0.034 – 0.068	1.5 – 3.0
Yellow woodsorrel	0.068	3.0

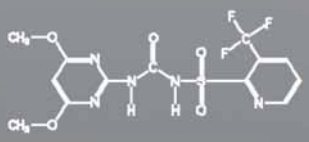
Some difficult to control weeds may require multiple applications.

Flazasulfuron

ENVIRONMENTAL FATE/EFFECTS

Katana has low potential to volatilize from soil or water or to bio-accumulate. It is practically non-toxic to birds, mammals and bees and toxic to terrestrial and non-vascular aquatic plants.

PHYSICAL AND CHEMICAL PROPERTIES

Common name:	Flazasulfuron
Chemical name:	N-[[4,6-dimethoxy-2-pyrimidinyl) amino] carbonyl]-3-(trifluoromethyl)-2-pyridinesulfonamide
Chemical formula:	
CAS number:	104040-78-0
Molecular weight:	407.3 g/mol
Melting point/range:	147 – 150°C
pH:	4.01
Density:	0.79 g/cm^3
Water solubility (20°C):	pH 7 — mg/ml 2.1
pK$_a$ at 20°C:	4.37
Vapor pressure (25°C):	<1 x 10^{-7} torr
Soil half life:	About 1 month
KOC – organic-carbon sorption constant (ml g^{-1}):	46

MAMMALIAN TOXICITY

Hazard Indicator	Technical
Acute oral LD^{50}	>5000 mg/kg
Acute dermal LD^{50}	>2000 mg/kg
Acute inhalation LC^{30}	>5 mg/L
Eye irritation	Minimal conjunctivitis through 48 hours. Free by 72 hours.
Skin irritation	No erythema, edema or dermal effects observed at application site.
Skin sensitization	Not a sensitizer.

ENVIRONMENTAL SAFETY

Hazard Indicator	Technical
Freshwater fish	Acute 96 hour LC$_{50}$: 22 Chronic 21 day NOEC: 5
Freshwater invertebrate	Acute 48 hour EC$_{50}$: 25 Chronic 21 day NOEC: –
Marine invertebrate	Acute 96 hour LC$_{50}$: –

PACKAGING

3-ounce bottles with measuring device packed 4 bottles per case

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