# Buffelgrass is a wildfire waiting to happen.

6th Annual **Beat Back Buffelgrass DAY**

**Saturday, Jan 26, 2013**

We need you- To volunteer, sign up online at:

www.buffelgrass.org

Sponsored by Southern Arizona Buffelgrass Coordination Center.

# Buffelgrass Pull
# Safety Tips

**Preparation:**

- Wear sturdy shoes and long pants. – absolutely no open-toed sandals!
- Bring sun glasses, sunscreen, hat, work gloves, and water.
- Digging bars and gloves may be provided by group leader, unless otherwise noted before project date.
- Pulls shall only proceed during daylight hours and good weather.

**Safety:**

- Do not work alone (minimum team 2-3 persons).
- For safety reasons, groups who have participants under 12 years of age are limited to cleanup of age-appropriate areas such as neighborhoods, parks, selected washes, trails and desert areas. No one under the age of 18 may participate in buffelgrass pull events along major streets.
- Determine who is responsible for supervising child participants away from busy or unsafe areas. Child participants must be supervised at all times.
- Stay with your group in the designated clean up boundaries.
- Don't trespass on private property or neighbors' yards.
- Use caution when encountering the following: cacti, animal burrows, steep slopes, snakes, lizards, bees and scorpions (especially when moving rocks). Immediately report potentially unsafe or dangerous situations to the group leader.
- Use caution while members use a digging bar
- Do not put your hand in any dark area without looking first. Sweep a digging bar through the grass to encourage snakes and other desert residents to move on.
- If you hear thunder immediately discontinue working, especially those holding a digging bar.
- Carry miscellaneous medical items like bandages, antibiotic cream, anti-itch cream and tweezers if your group does not have a first aid kit.
- Drink plenty of water.
- Work at your own pace and rest at reasonable intervals.
- NO SMOKING AT ANY TIME. Buffelgrass is highly flammable.
- Do not pick up hazardous materials such as car batteries, animal carcasses, needles, urine bottles or any other object that appears questionable.
- Keep away from any construction or maintenance projects. Stay out of utility installations, culverts and drainage structures.
- Participants shall return to the designated meeting place at the end of the clean up to report problems or area maintenance concerns like graffiti, illegal dumping, unnatural debris, or man-made blockages.

**Safety Working along Roadsides:**

- Pulls along major thoroughfare right-of-way shoulders may only take place between 9:00 a.m. and 3:30 p.m. on weekdays to avoid rush-hour traffic, or during daylight hours on weekends. Projects in residential areas are permitted between 7:00 a.m. and 5:00 p.m.
- Wear bright clothing if vests aren't available.
- Be aware of traffic - never assume that drivers see you.
- Work as a group facing oncoming traffic at all times.
- Clean-up should be done on one side of the street at a time, or with volunteers divided into teams working separately on each side.
- Do not distract motorists with horseplay or abrupt erratic movements.
- No Cell Phone Use during street-side projects, except in emergencies. Absolutely no text messaging permitted! Please leave individual music players at home. Volunteers must listen and watch for traffic and communication between other volunteers. For non-urgent calls or message responses, please return to your vehicle or a safe site outside the project boundaries.
- For major thoroughfares, orange "Road Work Ahead" signs must be placed by the group leader or other designated team member at both starting boundaries of a street clean-up project, prior to any volunteer work being performed.
- Volunteers are not permitted to work in the medians of major thoroughfares.
- Do not remove litter or buffelgrass directly from the paved roadway, beyond the curb, or on bridges, for the safety of volunteers and traffic.

**Safety Working in Washes:**

- Buffelgrass pulls in washes may only take place between 7:00 a.m. and 5:00 p.m.
- Please park outside of the wash channel to ensure safe volunteer access. Off-road motorized vehicle traffic in wash channels is also prohibited.
- Volunteer participants under the age of 18 must be accompanied by a parent or guardian at all times.
- Do not enter tunnels without an immediately visible exit, areas with a drop in elevation that cannot be easily traversed by normal hiking, or areas with standing water or thick mud.
- Please use existing entrances to washes at streets or gently-sloped wash banks, avoiding steep natural and concrete slopes. Do not create new trails that disturb vegetation or encourage erosion.
- Pulls shall be postponed or stopped immediately if any of these conditions are present:
    - Any amount of flowing water in the wash, or a flash flood warning or watch
    - Rain, lightning, or heavy winds are present at the project start time or visible within two hours before in the Tucson area, greater than 30% chance of rain
    - Severe storm warning or watch

If any of these conditions develop while the project is in progress, volunteers should immediately leave the wash and any adjacent low-lying areas

**If a dangerous situation develops (e.g. bee swarm or animal acting strangely) leave area immediately.**

Southern Arizona Buffelgrass Coordination Center
1955 E. Sixth Street
Tucson, AZ 85719

Saturday, January 26th, 2013

www.buffelgrass.org

# SABCC and BBBG Day

SABCC's Mission is to provide a regional coordination and facilitation center that emphasizes an integrated management approach to address and control buffelgrass (*Pennisetum ciliare*) in Southern Arizona.

**Because:**

- Unlike our forests, the desert is not adapted to fire. And buffelgrass is a wildfire waiting to happen.
- When dry, buffelgrass burns readily and far hotter than native grasses and plants. The native vegetation, unaccustomed to fire, is permanently destroyed while the buffelgrass thrives. As buffelgrass colonizes more areas, native plants and animals are displaced and the threat of fire increases across the landscape.
- Our economy is based to a large extent on our environment. If fire destroys the scenic beauty around us our tourism industry will be jeopardized and our ability to recruit business to the area will be compromised.
- The invasion knows no legal boundaries. We all have to work together to eliminate this threat.
- Doing nothing is a decision that is not without consequences. Adapting to fire in the desert will also take significantly more resources and planning.

**To accomplish our goals we have undertaken several projects and activities:**

- Beat Back Buffelgrass Day – a yearly event to bring the issues and need to the community and let citizens experience for themselves the work entailed in managing buffelgrass.
- Developed a risk assessment map for regional strategic planning in the Tucson Basin.
- Developed Data Management and Decision Support Systems in conjunction with the USGS and Colorado State University to support the work of all the agencies fighting buffelgrass.
- Sought and received FEMA funding for buffelgrass mitigation projects.

**What you can do:**

SABCC is a grassroots organization that depends on the multiple organizations and agencies with which it works to help fund the projects which we all share.

- Educate yourself on the issues – go to www.buffelgrass.org
- Educate and involve your neighbors
- Contact your public officials and voice your support for buffelgrass management efforts
- Donate on line (www.buffelgrass.org) or by sending a check to 1955 E. 6th Street, Tucson, AZ 85719
- Volunteer for some of the weedwacking groups listed on the other side of this flyer

# Volunteer opportunities

If you are interested in contributing your time and energy to buffelgrass control, there are a variety of ways in which you can get involved and help.

- Set a good example by removing invasive species from your yard. Then encourage your neighbors and friends to do the same.
- Schedule a buffelgrass presentation for your church, home owner's association, or other community group to learn more about what can be done. (520) 615-7855 or email the Pima County Environmental Education Department (eeducation@pima.gov)
- Participate in a volunteer weed pull. Weed pulls are regularly scheduled in a variety of locations and you may join in these efforts throughout the year. The SABCC Website (www.buffelgrass.org) lists many opportunities on its calendar. Some of the groups are listed below.

Sonoran Desert Weedwackers/ Wednesday Weedwackers
Saguaro National Park (Rincon Mountain District) Weedwackers
Weed-Free Trails Program. SNP
Tucson Clean & Beautiful
Oro Valley Buffel Busters
Marana Weedwackers
Friends of Ironwood Forest
Desert Defenders
Neighborhood Weedwacking Groups in Tucson
Phoenix Weedwackers
Pima County Buffelgrass Education Outreach Program
Outside groups helping the Sonoran Desert Weedwackers (listed on the website page)

If you would like to form your own group and would like more information, please contact Marilyn Hanson (mfhanson@comcast.net)

**Why is buffelgrass a problem?** Buffelgrass, an introduced invasive grass, forms dense stands, crowding out native plants and animals, and bringing fire to an ecosystem that is not meant to burn. Please visit www.buffelgrass.org for more information.

**Invades undisturbed desert habitat**

**Competes with saguaros and other native vegetation**

**Fuel load is 3x higher than typical desert, leading to large wildfires**

**Inhibits animal movement, alters habitat and displaces wildlife forage**

**Wildfire kills desert plants & animals, and poses a major safety hazard to adjoining urban areas**

## What do you do if you have buffelgrass on your property?

There are two main ways to remove buffelgrass effectively; if the plant is green, herbicides can be used to kill the plant. Herbicide only works on actively growing plants, thus it has to be green when you spray it. If less than 50% of the plant is green manual removal is the best method. With any removal technique, a follow up treatment will have to be performed for the next 3-5 growing seasons, thus removing the seed that is still in the soil.

**Chemical Control (Herbicide):**

- Plants must be at least 50% green and actively growing for herbicide to be effective; this usually occurs during the monsoon rains, but can also occur in the winter if climatic conditions are right
- Products containing glyphosate are very effective and are readily available at hardware stores
- Follow the label directions; a 2% glyphosate solution works well to kill buffelgrass
- Spray enough herbicide to coat all the green leaves, but not to the point that it drips off
- Adding a dye to the chemical solution can help you to avoid spraying non-target species

**Manual Control (Pulling):**

- Mowing alone is not an effective control method; this actually stimulates new growth
- A digging tool is needed to loosen the soil around the plant so that it can be pulled up without leaving the base of the plant behind; if part of the plant remains in the soil, it will resprout
- Soil bars (aka Caliche bars, digging bars, rock picks) work well; wedge soil bar point into soil at base of plant at an angle, push down on soil bar to lever plant out of ground
- Shake dirt off of roots and place in a heavy duty trash bag
- If a blanket of seeds remains, sweeping them up will minimize the # of seedlings next season

**Disposal:**
Place plants that are pulled up into trash bags and place with other trash items to be collected by the city.

WIPE OUT BUFFELGRASS

Volunteer with us! For more information regarding volunteer efforts in the region, contact the Southern Arizona Buffelgrass Coordination Center.

**info@buffelgrass.org or 520-626-8307**

**www.buffelgrass.org**

SOUTHERN ARIZONA Buffelgrass COORDINATION CENTER

Updated January 2013

# Buffelgrass (*Pennisetum ciliare*) Identification

Buffelgrass can look dramatically different depending on the time of year. It can be lush and green after good rains, but quickly dries down to a straw colored plant. Below are a few characteristics that will help you to correctly identify buffelgrass.

**GREEN BUFFELGRASS. Inset shows inflorescence (seed heads).**

**Volunteer removing DRY BUFFELGRASS.**

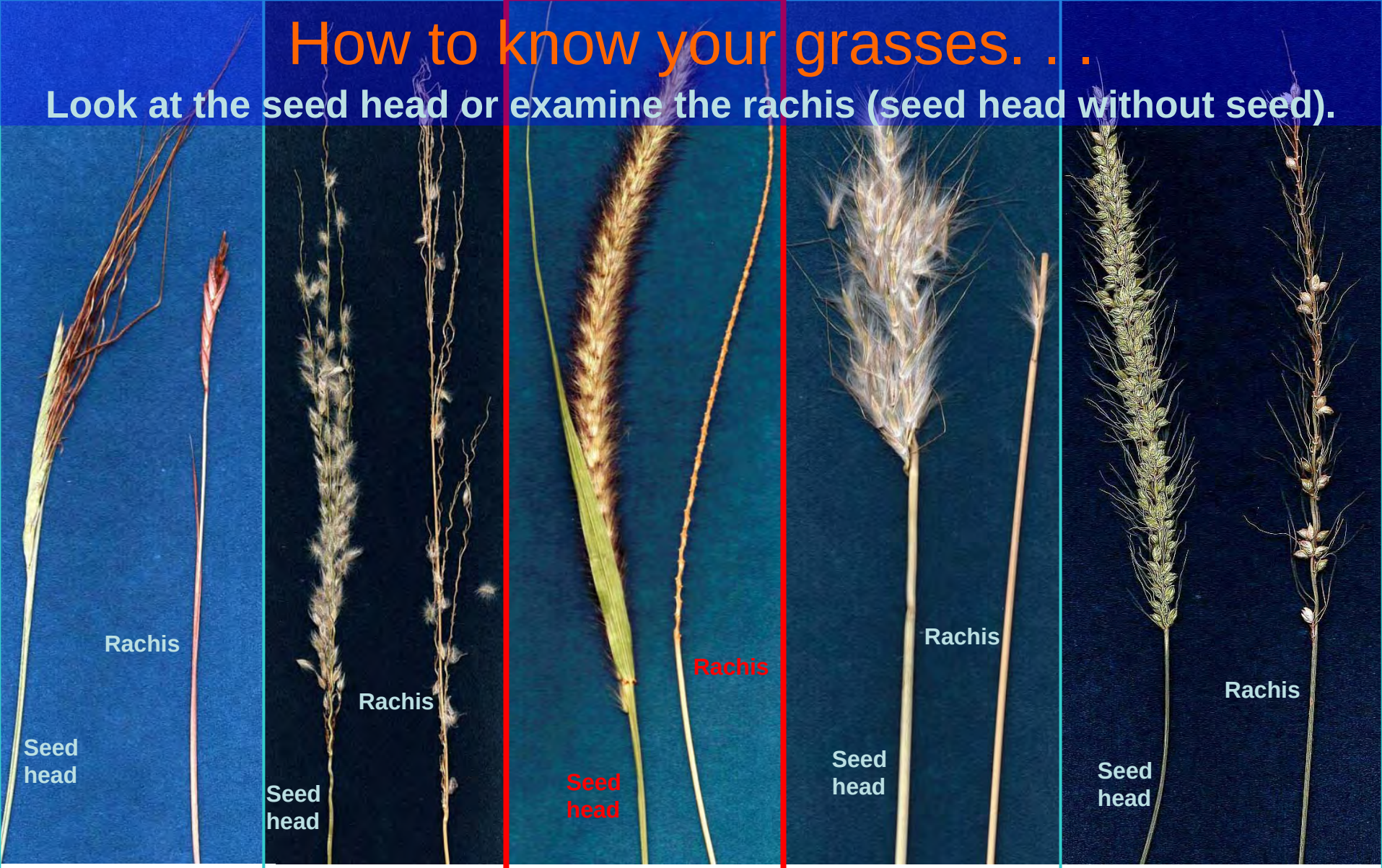
**BOTTLE BRUSH SEEDHEADS: Buffelgrass has a very distinct flower that looks like a bottle brush. The flower can range in color from reddish or purplish brown when seeds are young to a tan color when seeds are mature.**

**ROUGH RACHIS: Once the seeds fall from the plant, the rachis (central stem where the seeds were attached) is very rough to the touch.**

**HAIRY LIGULE: Tiny whitish/blond hairs can be seen at the base of the leaf where it diverges from the stem.**

# How to know your grasses. . .

**Look at the seed head or examine the rachis (seed head without seed).**




**Tanglehead**

*Heteropogon contortus*

**NATIVE**

**AZ Cottontop**

*Digitaria californica*

**NATIVE**

**Buffelgrass**

*Pennisetum ciliare*

**EXOTIC**

**Cane Bluestem**

*Bothriochloa barbinodis*

**NATIVE**

**Bristlegrass**

*Setaria species*

**NATIVE**

# Buffelgrass (*Cenchrus ciliaris L.* syn. *Pennisetum ciliare* (L.) Link) Fact Sheet

Origin/History

- Native to Africa, Asia, and arid and semi-arid Europe [15]
- US Soil Conservation Service brought to southwest in early 1940s [2]
- T-4464 is most common variety in North America [3,22]

Distribution

- Occurs in the following US states: AL, AZ, CA, FL, HI, LA, MO, MS, NM, NY, OK, TX (also in Puerto Rico and the Virgin Islands) [4]
- In Arizona, occurs in Pima, Pinal, Maricopa and Yuma counties [5]
- Has invaded and become established in disturbed and intact desert scrub environments in Australia, Hawaii, Mexico, and the southwestern US [22]
- High salinity, freezing temperatures, tight clay soil, deep sand, high water table and poor surface drainage limit distribution (Texas) [14]
- More than 1 million ha in central Sonora, Mexico, have been converted from native desert scrub and thorn scrub to *P. ciliare* pasture since the 1940's [28]

Growth Form/Reproduction

- Perennial bunchgrass, sometimes stoloniferous [1]
- Apomictic [46] and sexual reproduction is rare [47]
- Sexual reproduction, recombination, and gene flow within and between buffelgrass populations has been document (laboratory) [61]
- Seed set more likely when plants cross-pollinate than when self-pollination occurs in its native habitat [6]
- Reproduce vegetatively through rhizomes and stolons [7,22]
- Seeds are viable in the soil for up to 4 years (Australia) [8] while others estimate extreme longevity from 2 to 30 years [48]
- Seed dispersal occurs by water, wind, animals (livestock and wild) and humans (on clothing and via vehicles) [1]

Germination/Growth

- Seeds can mature within the range of a few months up to 18 months [7] however observations at Saguaro National Park suggest seed maturity within a month [41]
- Germination occurs between 50° F and 104º F, with optimal germination occurring at 86º F/68º F day/night temperatures [9]
- Three-month-old seed from 30 *P. ciliare* ecotypes germinated at an average rate of 16.2% (laboratory) [10]
- Minimum precipitation needed for germination in a green house is 0.124 in. on each of two consecutive days (southern Arizona) [11]
- Optimal soil depth for germination is 0.4 – 0.8 in [7]
- Germination can occur at soil pH levels from 3.0 to 7.0; rarely outside that range [12]
- Leaf growth occurs when mean minimum temperature is above 50º F; active growth occurs only when mean minimum temperatures are between 59-68º F and mean maximum temperatures are below 104º F [3]
- Optimum photosynthesis temperature is 95º F [18]

- Dormant, mature plants put on new growth after soil temperatures exceed 75° F and precipitation begins (Texas) [14]
- Observations at Saguaro National Park have seen growth and germination during wet and mild winter seasons [41]
- Observations indicate reproduction within the span of six weeks; can produce inflorescences multiple times a year; and reproduce in less than 6 weeks [41]
- Seedling establishment occurs most frequently at the start of the wet season [22]
- Production decreases as plant density reaches 5 – 10 plants/yd² (Texas) [14]
- After a dense patch burns, open areas allow increased solar radiation at the soil surface, resulting in increased photosynthesis and colonization [18]
- Withstands extreme environmental conditions: strong wind, soil erosion, nutrient-depleted soils and aridity (Sonoran Desert) [29]
- Seed dormancy increases if water stress occurs when seeds are maturing [34]
- Seed dormancy decreases when soil fertility and temperature increase [34]
- Improved overall growth performance under elevated CO2 levels [49]

Soil Preferences

- Persists well in well-drained loam, sandy loam, clay loam and sandy clay loam soils; will lose vigor and die when established in silt, silt loam, silty clay loam, silt clay and clay soils [3,51,52]
- Does poorly in sand because of low water-holding capacity and poor fertility (Texas) [14]
- Spreads in areas with low N and organic C levels [13]
- Tolerates soils with low level of nutrients; with increased nitrogen shows increased water use efficiency, crude protein and dry forage yields and widened shoot/root ration with increased phosphorus (Australia) [51]

Climate/Precipitation

- Thrives at elevations from sea level to 4265 ft .[15] Can established from seed at elevations from 19 – 2720 ft.; collected in New Mexico at 5597 ft [3,42]
- To establish and persist, needs 90 growth days in summer [3]; observations at Saguaro National Park suggests it needs about 12-24 days [41]
- In North America, spread occurs in areas where mean minimum temperature range is between 41 - 59º F in the coldest month and mean maximum temperature range is between 75 - 90º F [13]
- 95º F is the optimum temperature for photosynthesis [7]
- Performs best in arid regions with rainfall during the growing season of 7.1 to 9.8 inches [33]
- Favorable rainfall ranges from 8 inches (in the Turkana Desert and northwestern Mexico) to 49 inches (Australia); desirable rainfall can occur bimodally in summer/winter or summer/fall, bimodally in summer, or during a summer peak [3]
- Establishment and potential spread most likely in areas with annual precipitation of 13 – 22 inches; minimum precipitation required for establishment and spread is greater than 6.7 inches in summer [3]
- Does well in areas where precipitation ranges from 6 – 24 inches, mostly occurring in summer (Sonoran Desert) [16]
- Withstood 5-day flooding with no plant loss, and 20-day flooding with 20-85% losses (dependent on the cultivar); taller, ungrazed cultivars were more resistant to flooding (Australia)[17]
- Dormancy occurs in response to water stress (Tunisia) [19]

Competition

- Fewer young saguaros ( <2m) are present where buffelgrass dominates i.e. > 43% cover (Sonoran Desert) [56]
- Native plant richness and diversity declined with increasing time since invasion (southern Arizona) [56]
- Reduced native plant species richness and cover (Australia, Sonoran Desert, Texas) [25,53 56-58]

- Brittle bush (*Encelia fainosa*) and little leaf palo verde *(Parkinsonia microphylla*) are significantly reduced where buffelgrass dominates i.e. > 43% cover (Sonoran Desert) [56]
- Columnar cactus (*Pachycereus pectin-aboriginium)* establishment have been limited by buffelgrass (Sonora, MX) [60]
- Directly outcompeted native perennial grass Arizona cottontop (*Digitaria californica*) (laboratory) [59]
- Herbaceous species richness decreased in areas where *P. ciliare* was dominant; at some scales, species richness declined as *P. ciliare* biomass increased (Queensland, Australia) [25]
- Outcompetes several native shrubs, such as creosote, saltbush and bursage, and associated native grasses and forbs (observations at Organ Pipe Cactus National Monument) [22]
- Replaces native pili grass (*Heteropogon contortus*) communities in Hawaii [30]
- Displaces riparian acacias and eucalypts, as well as native grasses(Queensland, Australia) [38]
- Buffelgrass has been documented to have allelopathy properties (laboratory) [65]
- May inhibit germination and growth of legumes by producing phytotoxic chemicals [21]

Ecological Processes

- In the arid southwest, it promotes wildfire and re-sprouts readily after fires, excluding native vegetation and, thereby, altering plant communities [22,58]
- Buffelgrass fuel loads of 1- 4 tons per acre (Saguaro National Park) [26] ;this is 2 to 4,000 times higher than usual Sonoran Desert fuel loads including non-native grasses such as red brome and Mediterranean grass [26,27,43-45]
- Large volumes of standing dead matter makes buffelgrass burn hotter and faster than native grasses [54,55,58]
- Evidence to support that buffelgrass fueled fire has initiated a positive fire-invasion feedback (Australia, Sonoran Desert) [58,62]
- Negative affect on woody vegetation through a changed fire regime (Australia) [53]
- Decreased soil water infiltration and alteration of nutrient cycling (Sonoran Desert) [23]
- Invasion can negatively affect animal community structure by filling in open spaces needed by some bird species (Texas) [14]
- Changes soil by increasing organic matter content, which insulates the soil surface [13]
- Areas with high rainfall, *P. ciliare* grasslands have organic carbon- and nitrogen-poor soils (southwestern US) [13]
- Areas where rodent middens or fires have resulted in high levels of nitrogen and phosphorus, *P. ciliare* can displace and kill native vegetation (observations at Organ Pipe Cactus National Monument) [32]
- Soil erosion often increases when *P. ciliare* becomes established, causing increased surface water runoff and degraded water quality [31]

Expansion

- Patches have doubled every 2-7 years since 1988 (southern Arizona) [63]
- Modeling suggests that *P. ciliare* has the potential to cover 53% of the Sonora, Mexican based on elevation, soil type and rainfall [35]
- Imaging technology suggests that *P. ciliare* pastures increased from 7700 hectares to more than 140,000 hectares in Sonora between 1973 and 2000 [36]

Management and Monitoring

- Effective management involves an integrated approach, including manual control followed by chemical treatment and restoration [22]
- Research investigating the effectiveness buffelgrass control indicates (Saguaro National Park) [66]
    - Control treatments were less effective on south-facing aspects and on steep slopes.
    - Treatments were more effective in seasons with higher rainfall.
    - Effectively controlled when multiple treatments occurred in consecutive seasons and when both manual and chemical treatments were used.

    - Vast majority (83%) of plots showed reductions in patch area greater than 90%.
- Manual removal can control small patches of *P. ciliare* if the entire root is removed to prevent re-sprouting (Texas) [22, 41]
- Cutting or mowing can be used prior to herbicide application to decrease biomass, thereby requiring less herbicide to be used (Texas) [22]
- Continual, heavy grazing may decrease root depth and make herbicide treatment more effective; it may also make the plant less resistant to drought (Texas) [22]
- *P. ciliare* is less likely to become well-established in areas with dense vegetation and low light levels (Texas) [22]
- Repeated manual or chemical control within a growing season, within years and for several years is necessary to exhaust viable seed in the soil (observations at Saguaro National Park) [41]

Detection

- Multi-spectral imagery (such as Landsat TM) alone has been unsuccessful at detecting buffelgrass at a small scale [64]
- Multi-spectral imagery coupled with field measurements of hyperspectal plant signatures, detection is possible with multi-spectral imagery but only at high abundance levels [64]

Grazing and Forage Value

- Plant is very tolerant of heavy grazing [20]
- Tolerates short periods of over-grazing; prolonged heavy grazing results in decreased root growth [14]
- Under cultivation, annual productivity of *P. ciliare* is between 1 and 37 metric ton/hectare, depending on environmental conditions [39]
- Seed yield was 150-210 kilogram/hectare without added nitrogen (Tanzania) [7]
- Seed yield without irrigation or added nitrogen was 8 kg/ha (Queensland, Australia) [7]
- *P. ciliare* is considered a highly nutritious pasture grass in hot, arid regions. One hundred grams of green grass contains 110 g protein, 26 g fat, 732 g total carbohydrate, 319 g fiber and 132 g ash. One hundred grams of hay reportedly contains 74 g protein, 17 g fat, 792 g carbohydrate, 352 g fiber and 117 g ash [40]

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