

# Pampasgrass and Jubatagrass

## Threaten California Coastal Habitats

WRIC Leaflet 99-1  
01/1999 (edited 01/2010)

Joseph M. DiTomaso<sup>1</sup>, Evelyn Healy<sup>1</sup>, Carl E. Bell<sup>2</sup>, Jennifer Drewitz<sup>1</sup>, and Alison Stanton<sup>1</sup>  
<sup>1</sup>UC Davis; <sup>2</sup>UCCE Imperial County

### Where do they come from?

Pampasgrass (*Cortaderia selloana*) is native to Argentina, Brazil and Uruguay, where it grows in relatively damp soils along river margins. It was first introduced to Europe in the early 1800s by a Scottish horticulturist. In 1848, nurserymen introduced pampasgrass to Santa Barbara, California. Commercial production began in California in 1874, and by 1895 nurserymen near Santa Barbara were the primary producers of pampasgrass as ornamental plants. In 1946, the Soil Conservation Service throughout Ventura and Los Angeles counties planted pampasgrass to provide supplementary dryland forage and prevent erosion.



Jubatagrass infestation along the coast

Jubatagrass (*Cortaderia jubata*) is native to northern Argentina, and along the Andes of Bolivia, Peru, and Ecuador. It was first cultivated in France and Ireland from seed collected in Ecuador. It is not clear how or when it was introduced into California, but it may have come through France, via the horticultural trade.



Jubatagrass plant in redwood forest

Both species are true grasses (members of the Poaceae).

### What problems do they cause?

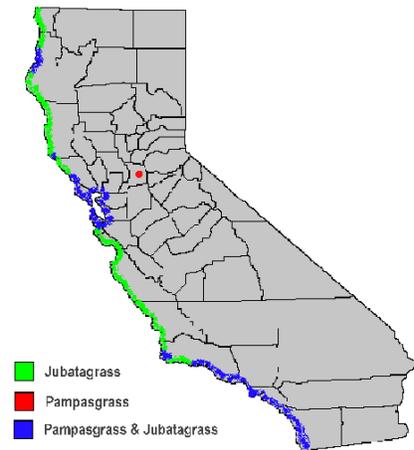
Jubatagrass is the more widespread and aggressive species. It is often called pampasgrass because of the difficulty in distinguishing the two species. Once established, mature plants of both species are very competitive. Large infestations of pampasgrass and jubatagrass threaten California's coastal ecosystems by crowding out native species, particularly in sensitive coastal dune areas. From a health standpoint, the saw-toothed leaves can cause injury to humans.

Jubatagrass is a major problem in cutover coastal redwood forests in Northern California, and can severely hamper conifer seedling regeneration efforts. Both pampasgrass and jubatagrass are also important weed problems in forestry operations and conservation areas in other parts of the world, particularly New Zealand and Australia. In some areas large clumps can prevent access to fires or present a fire hazard themselves.

## Where are they weedy in California?

Jubatagrass was first reported as a weed in 1966 in logged redwood forests of Humboldt County. Since then it has become common in disturbed ditch banks, road cuts, cliffs and cut-over areas, and eroded or exposed soil below 2,600 ft from San Diego County to the Oregon border. Although it is typically found on sandy soils, it can survive on other soil types, including serpentine.

Pampasgrass is a commonly grown ornamental throughout California, including interior regions. It has escaped cultivation in Southern California, and appears to be more common than jubatagrass from Santa Barbara to San Diego County. It has also escaped cultivation in moist soils along the American River near Sacramento, but is rarely invasive in dry inland habitats. Despite its widespread use as an ornamental, pampasgrass rarely escapes cultivation away from the coast. Although it is not currently considered a problem in the Central Valley or inland foothills, it has the potential to spread where male and female plants co-exist.



Areas of jubatagrass and pampasgrass infestation

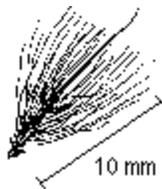
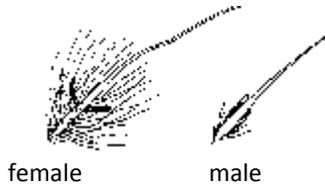
## How do you tell the difference between the two species?

Pampasgrass and jubatagrass are very similar in appearance and are difficult to distinguish. Even botanists have not made clear distinctions between these two plants until recently. Despite the widespread distribution of jubatagrass, floras prior to *The Jepson Manual: Higher Plants of California* (1993) recognized only pampasgrass (*Cortaderia selloana*) in California. While distinguishing between the two species is not important to the use of a specific control technique, the differences in their reproductive biology are critical to the mechanism and potential for spread in each of these species, particularly from sources originating within the nursery industry.



(1) plumes of jubatagrass showing purple coloration;  
 (2 & 3) male pampasgrass;  
 (4 & 5) female pampasgrass; note purplish tinge in male pampasgrass plumes

The major differences between jubatagrass and pampasgrass are listed in the Table. Vegetatively, mature jubatagrass tussocks are generally shorter and broader than the erect, fountain-like tussocks of pampasgrass. The plumes of jubatagrass are purple to tawny in color and are exerted to a greater height above the tussock than the creamy white plumes of female pampasgrass. However, male pampasgrass plants can have plumes that can be as long as jubatagrass, and more violet than female pampasgrass. Thus, they can look like a cross between jubatagrass and female pampasgrass. These characteristics of the male plants have led some to incorrectly conclude that the two species hybridize.

Character	Jubatagrass ( <i>Cortaderia jubata</i> )	Pampasgrass ( <i>Cortaderia selloana</i> )
<b>Reproductive traits</b>		
<ul style="list-style-type: none"> <li>• Reproduction</li> <li>• Sex expression</li> </ul>	Seed produced asexually Female flowers only	Seed produced sexually Male and female flowers on separate plants (female plants can produce a few bisexual flowers)
<ul style="list-style-type: none"> <li>• Chromosome number</li> </ul>	2n=108	2n=72
<b>Tussock</b>		
<ul style="list-style-type: none"> <li>• Typical height at maturity (not including flowering stems)</li> </ul>	1-1.5 m (3-5 ft)	2-4 m (6-13 ft)
<b>Leaves</b>		
<ul style="list-style-type: none"> <li>• Habit</li> <li>• Color</li> <li>• Tips</li> </ul>	Ascend more horizontally, spreading Bright green Appear broader, less coiled	More erect, fountain-like Bluish-green Appear narrower, more coiled
<b>Flowering stems/culms</b>		
<ul style="list-style-type: none"> <li>• Height above tussock</li> </ul>	1-2 m (3-6 ft)	female: 0-1 m (0-3 ft) male: 0-2 m (0-6 ft)
<b>Inflorescence</b>		
<ul style="list-style-type: none"> <li>• Immature panicle color</li> <li>• Mature panicle color</li> <li>• 2° branches</li> <li>• rachilla color</li> </ul>	Deep violet Pinkish to dingy tan Purplish or dark Purplish or dark	female: white male: white to violet white, cream, male sometimes pinkish-tan green or straw-colored green or straw-colored, male sometimes purplish or dark near spikelet base
<b>Spikelets/Florets/Seed</b>		
<ul style="list-style-type: none"> <li>• Presence of anthers, stigmas (early flowering stage)</li> <li>• Glumes</li> <li>• Floret #/spikelet</li> <li>• Lemma hairs</li> <li>• Lemma length including awn</li> <li>• Awns</li> <li>• Florets showing stigmas or emerging anthers</li> </ul>	stigmas often with purple midvein 3-5 6-10 mm long 10-13 mm 0-4 mm longer than lemma hairs	female: stigmas male: anthers white, male sometimes purplish near base female: 5-7 male: 3-5 female: 1-10mm long male: absent female: 15-20mm male: 10-13mm female: 5-12mm longer than lemma hairs
		

## What makes them invasive?

### *Jubatagrass*

Germination generally occurs in spring and requires sandy soils, ample moisture and light. The temperature range is typical of coastal environments. After germination has occurred, initial growth is slow, but increases rapidly once seedlings become established. Seedling growth and establishment is most rapid on bare sandy soil and exposed road cuts, but requires cool foggy climate and moist soil. Seedling survival is low in shaded areas or in competition with grasses or sedges. Jubatagrass does not tolerate winter frost, warmer summer temperatures, more intense sunlight, and moderate drought. This may account for its inability to become established in the inland areas of California. Individual plants are capable of surviving about 15 years.



Jubatagrass seedlings

Jubatagrass plants have only female flowers, but are able to set viable seed without the need for pollen. This characteristic, called apomixis, is an important factor in its weediness. Thus, no pollination is necessary and all seeds produced are genetically identical to the parent plant. The development of seed occurs before flowering. The apomictic nature of jubatagrass is probably the most important characteristic responsible for its weediness as well as its limited range. An individual inflorescence or plume can produce 100,000 seeds and large clumps can make a million or more seeds. Flowering generally occurs from late July to September, often in the first year of growth. Some plants can flower twice during the same season. The tiny seeds are spread up to 20 miles from the mother plant by wind.

### *Pampasgrass*

Seedlings usually become established in spring and require sandy soils, ample moisture and light. Like jubatagrass, seedling survival is low in shaded areas or in competition with grasses or sedges. Unlike jubatagrass, pampasgrass can tolerate winter frost, warmer summer temperatures, more intense sunlight, and moderate drought. This accounts for its success as an ornamental in the hotter and drier inland areas of California.

In the nursery industry, pampasgrass is primarily propagated through division of mature plants. In nature, however, reproduction occurs only by sexual means with flowers produced 2-3 years after germination. Flowering usually occurs from late August through September, but occasionally in winter.



Pampasgrass male (right) and female (left) inflorescences

The species is considered functionally dioecious, that is, flowers of only one sex occur on an individual plant. Over the years, selection for ornamental plants in California has been for the showier plumes of the female plants. Within most populations in California the two sexes do not co-exist. Consequently, very few seed are produced. However, in areas where flowers of both sexes are present, seed production is high and escaped weedy populations are common. In New Zealand, selection for female plants has not been as rigorous. As a result, more seed is produced and pampasgrass has become a significant weed problem.



Male pampasgrass

## What can be done to prevent further spread?

### *Nursery industry*

Soon after the introduction of pampasgrass into California, nurserymen preferentially selected the showier female plants. These plants were propagated through vegetative cuttings. Over a period of time, few male plants were sold as ornamentals. For this reason, pampasgrass rarely produced viable seed and was not previously considered a significant threat to escape cultivation.

In recent years, however, some nurseries have propagated pampasgrass from seed. Since it is impossible to distinguish male and female plants before they flower, the result is an increase in the proportion of male plants in the population. Consequently, there has been an increase in the amount of viable seed produced and the species has escaped to become an invasive problem along the California coast, particularly in the southern regions. Furthermore, in some cases jubatagrass seed has accidentally been used to propagate nursery stocks. This has also contributed to the spread of the weed.

Most nurseries in California are well aware of the invasive qualities of jubatagrass and mixtures of male and female pampasgrass and take every effort to ensure that only female pampasgrass plants are produced and sold. It is critical that nurseries only propagate female pampasgrass through vegetative cuttings. Plants should never be grown from seed.

### *Preventing establishment*

Seeds do not appear to survive long in the soil. Seedling growth and establishment are most rapid on bare sandy soil and exposed road cuts, but typically require a cool foggy climate and moist soil. Seedling survival is low in shaded areas or in competition with grasses or sedges. Thus, using mulches, such as straw, in disturbed sites can prevent jubatagrass and pampasgrass infestations. Ideally, overseeding disturbed sites with desirable vegetation can hinder the establishment of jubatagrass and pampasgrass seedlings.

## Can they be controlled?

Many of the sites infested with pampasgrass and jubatagrass are environmentally sensitive, which limits the available control options. Unfortunately, biological control efforts have not been investigated. In addition, burning or grazing do not provide long-term control, as plants quickly resprout.

### *Mechanical control*

Pulling or hand-grubbing jubatagrass seedlings is highly effective. For larger plants, however, a Pulaski (axe on one end and hoe on the other), mattock (pick on one end and hoe on the other), or long-bladed shovel is the safest and most effective way of removing established clumps. To prevent resprouting, it is important to remove the entire crown and top section of the roots. Regrowth from the lower roots is unlikely. Detached plants left lying on the soil surface may subsequently take root and reestablish under moist soil conditions; therefore, some weed workers recommend turning the clump upside down so the roots are exposed to the air. A large chainsaw or weedeater can expose the base of the plant, allow better access for removal of the crown, and make disposal of the removed plant more manageable. Once flowering has occurred, cutting and removing or burning the inflorescence is important to prevent seed dispersal during the mechanical operation.



Roadside infestation of Jubatagrass

### *Chemical control*

Control of pampasgrass and jubatagrass can be achieved by spot treatment with a postemergence application of glyphosate (Roundup Pro) at about 2% solution or 8 qts. per 100 gal. Homeowner formulations of Roundup will require a 4% solution. The addition of a nonionic or silicon-based surfactant may be necessary to enhance foliar penetration of the herbicide. For most effective control at a 2% solution, plants should be sprayed to wet but not to the point of runoff. Summer and fall applications were both effective, as photosynthetic assimilates are translocating downward at a faster rate late during these seasons. In some cases it may be necessary to apply the herbicide prior to the maturation of viable seed in late summer. In addition to the standard 2% spray-to-wet application of glyphosate, a low volume glyphosate foliar treatment at 8% of product or a 33% solution of concentrated Roundup using a ropewick technique can also give excellent control. The low volume treatment has been shown to be the most cost effective. The graminicide fluazifop (Fusilade) applied as a low volume 4% (product) application in the fall also gave good control of jubatagrass.

In forestry operations, hexazinone (Velpar or Pronone) is a soil residual root absorbed compound also effective in the control of pampasgrass. Once plants have been killed, clumps can be removed mechanically and left to decompose naturally. In wildlands, leaving the dead clumps may prevent subsequent pampasgrass or jubatagrass seedling establishment.

### *Combinations*

For very large clumps, cutting or burning can remove the top foliage and the regrowth can be treated with a systemic postemergence herbicide. This method reduces the amount of herbicide applied compared to treatment alone.

