ELEMENT STEWARDSHIP ABSTRACT
for

Cortaderia jubata

Pampas Grass

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Authors of this Abstract:
David L. Peterson, Mary J. Russo (Revision)

The Nature Conservancy
Element Stewardship Abstract
For *Cortaderia jubata*
including C. atacamensis)

I. IDENTIFIERS

Common Name: Pampas grass

General Description:
Cortaderia jubata is a large tussock grass with most of its leaves near the base and narrow, attenuate blades. The panicles are large, terminal, and plume-like. Spikelets are several flowered, with internodes of the rachilla jointed, the lower part glabrous (smooth), the upper part bearded. Glumes extend beyond the lower florets. Plants are dioecious (staminate and pistillate flowers on different plants), with male spikelets covered with long hairs.

Distinctive features of C. jubata are huge nodding pinkish or purplish flower plumes (later turning creamy white), and dark green 1-cm-wide drooping leaves with razor-like margins. Flower stems rise up to 3 times higher than the clump of foliage. This contrasts with another commonly planted pampas grass, C. selloana, which has narrower, blue-green leaves and glistening white plumes when mature. The most important feature of C. jubata as a weed is that it produces abundant seeds annually and establishes rapidly on bare soil, while C. selloana sets relatively few seeds and rarely becomes naturalized (Conner 1971).

Cortaderia jubata and 23 other species in the genus are described in Conner and Edgar (1974).

II. STEWARDSHIP SUMMARY

Cortaderia is highly competitive with native plants once seedlings become established and is a substantial threat to the ecological quality of preserves, particularly in coastal and grassland sites. Its rapid growth and accumulation of above- ground and below-ground biomass allow it to acquire light, moisture, and nutrients that would be used by other plants. It can be damaging even at low densities because of the amount of cover it can occupy. Particularly threatened habitats include coastal sand dunes and inland sand hills that contain a number of rare and endangered plant species. Cortaderia is well established in several California state beaches and preserves (Cowan 1976).

Cortaderia can spread rapidly in favorable habitats such as those found in coastal preserves. The chief reason for its success as an invader is its prolific production of seed. Even a few plants have a large potential impact because the seeds are light and wind-dispersed. Because it is a perennial plant, existing plants as well as new seedlings pose a threat to native species.

Cortaderia is a naturalized tussock grass that outcompetes native vegetation due to its broad habitat requirements and abundant seed production. Adequate control of Cortaderia can be achieved with mechanical or chemical methods or both. If there are low densities of the weed or if the individual plants are quite small, physical removal is effective and minimizes impact on the native plant community. In the case of high densities or well-established plants, Cortaderia is best controlled with herbicide treatments.

Every effort should be made to control Cortaderia before it becomes well-established. Seed dispersal should be prevented within preserves as well as from areas adjacent to preserves.

III. NATURAL HISTORY

Habitat:

Cortaderia is native to the Andes Mountains of northern Argentina, Bolivia, Peru, and Ecuador at elevations of 2800 to 3400 m (Costas Lippmann 1977, 1979), where it can form nearly solid stands of several hundred hectares. It becomes established most easily in wet sandy soil without existing vegetation. However, it has broad habitat requirements and will grow vigorously in nearly any soil, under low or high moisture regimes, in full sun or dense shade (Cowan 1976). Cortaderia flourishes mostly in coastal areas and probably needs at least some summer moisture from fogs and freedom from freezing temperatures. Several consecutive nights of frost will generally not kill the plant, but can severely damage it (Costas Lippmann 1977).

Cortaderia was first cultivated in France and Ireland from seeds collected in Ecuador (Costas Lippmann 1977). Although it was used as an ornamental planting for some time, it was not recognized as a weed in California until the 1950s, when Munz (1958) reported that it had escaped from cultivation. By 1967, it was recognized as a serious weed which had spread over 300 ha in Humboldt County (Cooper 1967). At about the same time it was recognized that its range as a weed was spreading in New Zealand as well (Connor 1965).

Munz (1958) originally listed the range of Cortaderia as Ventura to Monterey counties. Ten years later it was reported at locations in San Diego County and in northern California along the Oregon border. At the current time it is most common in the coastal fog belt from Monterey County to Humboldt County; it is especially common in Monterey County. The attractive plumes of Cortaderia have made it a popular landscaping plant for many years. It has also been used as a forage plant for cattle in California (Lemon and Taylor 1949) and New Zealand (Pleasants and Whitehead 1977). It provides green forage during dry summer months and can be used as a substitute for hay. It can be grazed within 0.3 to 0.5 m of the base of the plant without severe damage.

Reproduction:

Optimal seed germination is obtained with high soil moisture, temperatures around 10 C, and at least some light exposure (Costas Lippmann 1976). Seedlings can germinate and become established in a variety of different soil types, including those derived from serpentine rock. Once it is established, Cortaderia is extremely competitive with nearby plants and tree seedlings. By the second year, a plant can be over 1 m tall and produce seeds of its own (Cowan 1976).

There are populations of Cortaderia that consist entirely of pistillate (female) plants that form seed without the necessity of pollination (apomixis) (Costas Lippmann 1976). Nearly all the ovules produced can therefore develop into viable seeds (caryopses) (Costas Lippmann 1979). This results in a huge seed output of up to millions of seeds per plant (Cowan 1976). All the seeds produced from a given plant are genetically identical because of apomictic reproduction. Costas Lippmann and Baker (1980) found that populations of Cortaderia generally have little variability in isozyme content, even among plants collected from diverse habitats and geographic locations. This low genetic variability is also related to apomixis.

Cortaderia grows best in full sunshine (Potter 1970) with adequate water, but can tolerate rather severe drought conditions once it is established. It has a deep root system that allows it to tolerate drought, although dry winds can cause some desiccation of the tips of leaves. The older a plant gets, the larger it becomes until it is up to 3 m tall with a large mass of roots, crown, and razor-sharp leaves (Cowan 1976). The normal lifespan of the plant is 10 to 15 years (Pleasants and Whitehead 1977).

IV. CONDITION

V. MANAGEMENT/MONITORING

Management Requirements:
There is good opportunity for recovery of native plant populations if Cortaderia is controlled with a strict management program. Physical removal of the plants is effective if they are small enough, but this method can be quite labor intensive. A number of chemical treatments are also effective and may be more practical for severe infestations.

Monitoring of Cortaderia is definitely needed to document population trends in and adjacent to preserves. The effects of the weed on native plants should be monitored as well as the effectiveness of management efforts to eradicate it. If populations are found to be increasing rapidly, an intensive effort to control its spread is necessary.

Both density and percent cover of Cortaderia should be periodically measured. The status of populations near TNC preserve boundaries should also be monitored because of the potential for seed dispersal. Populations of native species near areas of infestations should also be monitored.

According to Greg Wolley, former Preserve Manager for TNC's Ring Mountain Preserve, considerable effort in monitoring and controlling Cortaderia is underway at this preserve (Wolley 1985). Infested sites have been mapped for the preserve with densities recorded at each site. An eradication program using an herbicide (Roundup) has been initiated, and treatments are followed up with evaluations of effectiveness. The emphasis of the program has been to eliminate the largest plants first and therefore reduce the potential for seed dispersal.

Dawn Lawson reports that Cortaderia populations are also being monitored and controlled at Camp Pendleton Marine Corps Base, California (Lawson 1985). Good success has been obtained there by physically removing the plants; a rope or chain is tied around plants, and they are pulled out of the ground with a vehicle. Although effective, this is labor intensive.

Contact: Larry Serpa, Area Manager
Ring Mountain Preserve
3152 Paradise Dr., Room 101
Tiburon, CA 94920
(415) 435-6465

Dawn Lawson
Natural Resource Office
Marine Corps Base
Camp Pendleton, CA 92055

It is essential that Cortaderia populations be controlled on preserves because of its highly invasive and competitive characteristics. Well-established plants should be eliminated first because they can produce and disperse the most seeds, and because they are increasingly persistent with age. The older plants become, the more native species they can displace.

Mechanical methods can be used to eradicate Cortaderia, although this is usually practical only for small plants or small numbers of plants. Seedlings or small plants can be pulled or dug out. Large plants can be dug out with a pick and shovel if adequate manpower is available. Care must be taken to remove the entire root crown to avoid subsequent sprouting, although it is not necessary to dig up all the lateral roots (Cowan 1976). Plumes can also be cut off to avoid seed dispersal.

Well-established plants can be killed by removing the vegetation at ground level and soaking the crown with about 8 liters of diesel oil (Cowan 1976). However, the residual effect of the oil could be deleterious to other plants.

Amino triazol and dalapon have been used to control Cortaderia (Anonymous 1976), although no guidelines are available on concentrations. Roundup has been used to successfully kill both seedlings and large plants of Cortaderia. It should be sprayed on the plants early in the morning at concentrations recommended by the manufacturer. Because

Roundup is a broad spectrum herbicide, care should be taken to avoid spraying it on nontarget plants. In addition, it must be realized that even if herbicides are successful in killing the plant, a large amount of dead biomass remains on the surface to prevent access by native vegetation.

VI. RESEARCH

Management Research Programs:
Better information is needed on the long-term effectiveness of herbicide treatments on Cortaderia. Information is also needed on whether fire could be used to control the weed in certain grassland types.

The monitoring program at Ring Mountain Preserve discussed above will provide data on the effectiveness of herbicides on large populations of Cortaderia.

Programs to manage Cortaderia populations are underway at Ring Mountain Preserve and Camp Pendleton as described above. No widespread eradication effort or quarantine action is underway except on a local basis.

Contact: Larry Serpa, Area Manager
Ring Mountain Preserve
3152 Paradise Dr., Room 101
Tiburon, CA 94920
(415) 435-6465

Dawn Lawson
Natural Resource Office
Marine Corps Base
Camp Pendleton, CA 92055

George Gray
California Department of Parks and Recreation
Monterey
(408) 649 2846

Mike McElligott
Vandenburg Air Force Base
(805) 734 8232 ext 60978

Jack Biegle
(805) 773 2147

VII. ADDITIONAL TOPICS

VIII. INFORMATION SOURCES

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IX. DOCUMENT PREPARATION & MAINTENANCE

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Contributing Author(s): David L. Peterson, Mary J. Russo (Revision)