The Carrizo reed of the Andes, *Phragmites sp*.
A depurative plant, native in Colombia, South America
Medellín, Colombia. May, 2007

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1. Ancestral Use: In Colombia, Carrizo reed, *Phragmites sp.* is traditionally used to make musical woodwind instruments called: "Gaitas" and "Rondadores". These reed pipes are typical in many Indian communities in America.

Figure 1: Colombian peasants playing music in "Gaitas" pipes made of Carrizo reed. Photography (www.tamborygaita.com)

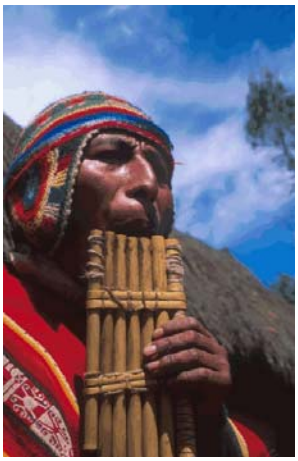

Figure 2:Inca Indian playing music, in a "Zampoña" made of Carrizo reed Photography (www.criollo.perujax.org.)

"The "Zampoña" is a musical woodwind instrument formed by two rows of Carrizo reeds. "Zampoña, Rondador and Antara" are similar to Pans pipe and they are typical of the American Indians of the Andes mountains. The "Quena" is another traditional pipe in Peru and it is also made of Carrizo reed." (www.criollo.perujax.org)

The ancestral use of Carrizo reed, *Phragmites sp.* in the Andes mountains is an evidence of its native condition, in America.

2. Depurative plant use: The Spanish Company, Ingenia Biosystem is promoting depurative plant technologies for sewage waters in Colombia, by means of subvertical flux constructed wetlands. In August 2006, this Company requested *Phragmites sp* plants for their projects, to the Fundación Grupo HTM, in Medellín, Colombia. For this reason this Foundation started to search for this reed and to study its propagation alternatives.

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3. Botanical information: “Carrizo reed or Fine Cane: *Phragmites sp*. In Spain, *Phragmites* is a miniature plant compared with Common reed, *Arundo* sp. which looks very much alike. This reed grows 1.50 mt. tall and 1.5 cm in diameter and has a plume-like terminal inflorescence of about 50 cm long. It grows in wetlands, from sea level to 1600 mt over sea level, where it forms homogeneous plant covers.” (www.sierradebaza.org).

“Carrizo reed, Common reed or Giant reed: *Arundo donax*. *Gramineae* Family. This is a Bamboo like plant, with glabrous and hollow stems, up to 4 cms in diameter and 6 mt tall. The leaves sheath the cane, and the blades are of about 30 to 60 cms long, by 5 to 7 cms wide. The inflorescence is a panicle of 1.0 mt long. Its habitats are wetlands in southern Europe, where it forms colonies.” (www.linneo.net).

This information isn’t enough to make a difference between these very similar reeds. These look so much alike, that in Spain, both are called “Carrizo”, over there *Arundo* plants are specified as Common reed, but in California, USA, Common reed is the name for *Phragmites* plants. This situation is confusing, there for we continued our investigation.

4. Searching for the plant: With the few botanical references on *Phragmites*, we went out to the mountains, on September, 2006, to search for this reed plant, fortunately we had known the native Carrizo reed previously. We found some of these plants in a site called El Yolombo, a rural zone of Medellín city, in Colombia. This reed plants grow in slow running sectors of mountain cheeks, at 2100 mts over sea level. The typical plant cover of this zone is: Low Mountain, Humid Forest (Holdrige), now in grasslands for cattle. See: Figure 3.

Figure 3: Carrizo reed plant in Medellín, Colombia. Photo Mauricio Muñoz, 2006

5. Characteristics of the native Carrizo reed: This reed forms a cane -like clump of 4 or 5 m^2 in a 1.0 mt wide creek bed. The plant has culms with diameters up to 4 cms and 6 mts tall, and internodes up to 40 cms long. The leaves have a pale green color, fine saw-like margins and the ligules or florets have hair in them.

Considering the hairy ligules, this specie can be *Phragmites,* nevertheless by its great size, it looks like *Arundo.* We didn't find flowers to verify its taxonomy. Even though, we collected plant material to try its horticultural propagation.

6. *Phragmites,* native genus to Colombia: "The majority of grasses are herbaceous, even though many bamboos and some other subfamilies, like *Arundinoideae* are woody. Their leaf includes a basal sheath, a narrow lamina; and a flap at their junction, called ligule.
This subfamily has large reeds with large plumose panicles:

- *Arundo:* Introduced from Europe and escaped in America,
- *Gynerium*: It is common in low elevation river banks and has large canes with leaves in fan- shaped clusters.
- *Phragmites:* (4 species). Large marsh cane several mts tall, with ecological restriction to true standing- water swamps. Their flowers differ from *Gynerium* in their perfect spikelets." (Gentry. 1993)

Gentry's reference confirms the presence of *Phragmites* as a native genus to Colombia, with 4 species. It also notes the large canes, which make a difference with the small size of *Phragmites* species in Europe and North America. This size difference, are frequent in other genus common to the tropical zones and the temperate zones, like: *Ficus, Rhus, Urera* and others.

7. An alternative genus: *Gynerium* genus is also native to Colombia, like Gentry mentions it, and its common name is Caña Brava, Tough cane. This plant is frequent between 500 and 1700 mts over sea level. Considering its ecological adaptations which are similar to that of *Phragmites,* this genus also has a potential use for constructed wetlands, especially in low tropical altitudes, where Carrizo reed is not adapted.

8. Clue Difference: "Giant reed, *Arundo donax,* is a robust perennial grass from 3 to 9 meters tall. The leaves are pale green, these clasps the stem with a heart-shaped base and taper to the tip. This reed produces a tall, plume-like flowerhead of a cream to brown color. Giant reed, in earlier stages can be confused with tall grasses and common reed *Phragmites,* native to North America; it is less than 3 meters tall, with a panicle less than 30 cm long and with long hairs in the florets." (Dudley. 1995)

9. A worthy comparison: In February 2007 the Technological University of Pereira, Colombia performed a Seminar on Constructed Wetlands. Several experiences with a great variety of plant species were exposed; these show the advantage of biodiversity. Some experiences with European *Phragmites* in Colombia were reported, but none with Carrizo reed of the Andes.

Doctor Hans Brix and Doctor Carlos A. Arias, from the University of Aarhus, Denmark, are leader investigators in these themes and made valuable expositions in this Seminar. They made emphasis in the importance of using native flora. For this reason we told them our adventure with the Carrizo reed of the Andes. They found it very interesting, because they had no report of *Phragmites,* in Colombia, and requested us for some botanical samples. We gladly accepted and are sending them, with great interest in collaborating with their collection and in the comparison of our Carrizo reed, with other *Phragmites.*

The Carrizo reed found in Medellín has hairs in the florets or ligule.

Dudley's reference about hairy florets, permits us verify that the Carrizo reed of Medellín has correspondence with this characteristic of *Phragmites* genus.

In the Andes mountains of Colombia, Carrizo reed is frequent between 1700 and 2500 mts over sea level, differing from European y North American *Phragmites* species that grow in altitudes from sea level up to 1600 mts.

Figure 4: Florets or ligules of the leafs of Carrizo reed from Medellín, Colombia
Photo: Mauricio Muñoz, 2006

Bibliography

1. Asociación Peruana de Autores y Compositores. Música Criolla. (www.criollo.perujax.org.)
2. Dudley, Thomas. *Arundo* expansion, in Cuatro Ciénagas Valley, California. California Invasive Plant Council. USA, 1995 (www.desertfishes.org.)
3. Gentry, Alwyn H. Woody Plants of Northwest South America. Conservation International. Washington DC. USA, 1993.
4. Linneo.net. *Arundo donax*. (www.linneo.net)
5. Los Gaiteros de San Jacinto. La Cumbia. Colombia. (www.tamborygaita.com)
6. Parque Nacional Sierra de Baza. Granada, España. *Phragmites sp*. (www.sierradebaza.org).

Note: We enclose reports of our initial Propagation Test of Carrizo reed; we expect these can be useful for other *Phragmites* horticulturists.

Attachment

Reed of the Andes, Propagation Test
Medellín, Colombia. October 2006 to March 2007

First Test (TI)
The planting material for this test was collected from wild plants, in a rural area of Medellín city, Colombia, at 2100 mts over sea level, with a media temperature of 19º C. It was planted in a nursery at 1450 mts over sea level with a media temperature of 21º C, also in Medellín. Summary results are shown in Table 1

Planting Material: Reeds with diameters from 4 to 15 mm were selected, to make cuttings from 10 to 20 cms long, including 2 knots, one to put in the soil and the other to leave in the air, just as used in the propagation of Guadua cane, *Bambusa guadua,* in Colombia.

Plantation: Reed cuttings of 4 types like: top cuttings, slip cuttings, simple cuttings and rootless rhizomes were planted in soil with compost fertilizer, contained in plastic bags of one kilogram capacity. Water irrigation was applied daily, without flooding.

Shoots: Wild reed cuttings developed aerial buds after 8 days and basal buds after 16. The basal buds grew faster, and on day 32 these surpassed the size of aerial buds, which were drying. 84 % of the samples had buds on day 28, and after 2 months, plant survival was 78 %.

Observations: The 4 mm reed cuttings and the 15 mm rhizomes developed the biggest plants, these reached 38 to 50 cm tall and abundant roots in 2 months.

Conclusion: Plants with 30 to 60 cm tall have a handy size to be taken out from the nursery. A 2 months harvestable plant is an unbeatable advantage for its production, compared with tree species that require 5 months in the nursery. The high survival shown by this Carrizo reed is a warranty for its nursery production.

Second Test (TII)
The planting material for this test was collected from plants cultivated in a nursery in Medellín city, and it was planted in the same place. Summary results are also shown in Table 1.

Planting Material: Reeds with diameters from 4 to 10 mm were selected, in base of the good results of the first test. Cuttings from 5 to 23 cm long were made, including 2 and 3 knots, to search for growth differences.

Plantation: Nursery reed cuttings of 4 different types like: top cuttings, rooted rhizomes, and 2 and 3 knots cuttings were planted, in the same way as the wild reed. The cuttings with 3 knots were cultivated with 2 knots on the air.

Shoots: Nursery reed cuttings, developed aerial buds after 4 days and basal buds after 12, 4 days sooner than the wild material. On day 24, the basal

buds surpassed the size of the aerial buds, which were drying like in the first test. On day 16 the samples with buds were 88 %, 12 days faster than in the first test, but plant survival was only 55 % after 2 months.

Observations: The buds of rooted rhizomes duplicated the growth of the buds of rootless rhizomes. The buds of the other cuttings grew 35 to 50 cms tall in 2 months, like in the first test. Comparing plant survival in both tests, one can note that it corresponds with the woody materials and plant mortality with the young material of the cuttings.

Conclusion: The rootless rhizomes and the reed cuttings show that root development demands a lot of effort from the plant and time in the nursery. The high bud survival of woody cuttings shows that this material keeps energy better than young cuttings, for this cause wild reed, with more maturity had better results. Nevertheless, the fast growth of Carrizo reed and the simplicity of this propagation technique, warrant an abundant nursery production

Table 1: Carrizo reed buds growth, in a nursery in Medellín, Colombia. (Summary)

TI	**September**	**01**	**01**	**05**	**09**	**13**	**17**	**25**	**29**	**03**	**15**	**31**	**October**
No	Days	Diam cm.	Tall cm.	04	08	12	16	24	28	32	44	60	Bud Quality
3	Rhizome Aerial bud	1.5	10	0								0	No bud
	Basal bud			0				1	3	7	36	50	Very good
4	Top cutting Aerial bud	1.0	16	0	1	2	5	0				0	Dried
	Basal bud			0								0	No bud
6	Slip cutting Aerial bud	0.4	13	0		1	3	6	7	8	0	0	Dried
	Basal bud								1	3	16	43	Good
12	2 knot cutting Aerial bud	0.4	12	0	1			2	2			0	Dried
	Basal bud			0			1	4	5	7	16	39	Good
TII	**January**	**14**	**14**	**18**	**22**	**26**	**30**	**07**	**11**	**15**	**27**	**15**	**March**
	Days	0	0	04	08	12	16	24	28	32	44	60	Bud Quality
3	Rhizome Aerial bud	10 cm.	3 cm.	11	18	23	29	33	40	52			Excelent
	Basal bud			0						0			Possible
4	Top cutting Aerial bud	0.4	23	0								0	Dried
	Basal bud			0			1	9	14	18	37	50	Very good
7	2 knot cutting Aerial bud	0.6	18	1	2	3	4	7	7	0		0	Dried
	Basal bud			0		1		2	2	0		0	Dried
8	3 knot cutting Aerial bud	0.4	19			1	1	0				0	Dried
	Basal bud						1	4	6	7	15	35	Good

Thank you very much for your attention.