

TECHNICAL NOTES

COFFEEVILLE PLANT MATERIALS CENTER

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ADVANCED EVALUATIONS OF GIANT REED: II. PLANTING POSITION STUDY

Abstract

The four accessions of giant reed selected for advanced evaluation were planted in four positions: (1) normal, (2) inverted, (3) tips up, and (4) tips down. Shoots generally emerged first from rhizomes planted in the normal and up positions, but survival was good for all by the end of the growing season. At the end of the first growing season, PI-432430 and PI-432432 appeared to be the best. The freeze of December 1983, when the temperature dropped to -2° F caused many of the rhizomes of PI-432430 to die. PI-432432 continued to perform well in the spring although it appeared to be damaged slightly more by freezing than PI-432429.

Introduction

Fourteen accessions of giant reed (Arundo donax L.) were evaluated for stream channel and shoreline erosion control at the Coffeeville Plant Materials Center (PMC) from 1976 through 1981, and four accessions were considered superior to the others because of better vigor and stem and rhizome production (Coffeeville PMC, 1982a). The four accessions of giant reed were:

<u>PI-NUMBER</u>	<u>MS-NUMBER</u>	<u>ORIGIN</u>
432420	4083	Yalobusha County, MS
432429	4198	Knox City PMC
432430	4199	Knox City PMC
432432	4364	Cuthbert, GA

Plans for advanced evaluation of the four accessions were developed in 1982 (Coffeeville PMC, 1982b), and studies were initiated to determine how different planting conditions affected establishment of these accessions from rhizomes so planting guides could be prepared and for other information. The first of these studies was initiated in 1982 to determine the effect that depth and time of year of planting had on establishment. The studies showed that establishment could be achieved under more adverse conditions than previously believed (Coffeeville PMC, 1987). In 1983, another study was initiated to determine how establishment might be affected when the rhizomes were planted in a somewhat haphazard position as might happen in actual situations. This is a report for the position study.

Materials and Methods

Rhizomes of the four accessions were planted at a depth of 5 inches (12.5 cm.) on May 18, 1983, in the advanced evaluation area in Oaklimer silt loam (0-2% slope) that had been plowed for weed control. One block of each accession was planted with one row of each of the four position treatments. Ten rhizomes were planted in a row with one of the following position treatments.

- (1) Normal - Rhizomes lying in the row with the buds to the top.
- (2) Inverted - Rhizomes lying in the row with the buds on the bottom.
- (3) Up - Rhizomes vertical with the buds pointing up.
- (4) Down - Rhizomes vertical with buds pointing down.

The treatments were randomized in each block.

Evaluations were made in June, July, August, and November of 1983 and again in March of 1984 to assess winter damage. The number of living rhizomes (those producing shoots) and the number of stems per row were recorded at each evaluation.

Results and Discussion

The number of rhizomes sprouting and stems for each accession and treatment at each evaluation is given in Table 1. Averages for all evaluations for each position are as follows:

<u>POSITION</u>	<u>RHIZOMES</u>	<u>STEMS</u>	<u>STEMS/RHIZOME</u>
Normal	7.45	85.65	11.50
Inverted	6.80	67.85	9.98
Up	6.50	65.90	10.14
Down	6.95	75.10	10.63

The normal position had the best average for rhizomes and stems, but it was not true for all accessions (Table II). A ranking of the accessions from 1-4 with 1 best is as follows:

<u>ACCESSIONS</u>	<u>RHIZOME</u>	<u>STEM</u>	<u>STEMS/RHIZOME</u>	<u>RANK</u>
432420	3 (tie)	4	3	4
432429	1	3	4	2 (tie)
432430	3 (tie)	2	2	2 (tie)
432432	2	1	1	1

This ranking is approximately the same as in the depth study evaluated for a shorter time when PI-432432 was the accession selected for monthly plantings in the date study (Coffeeville PMC, 1987).

Table III is a summary of data for all positions of each accession at each date. It shows about half of the rhizomes with at least one stem appearing after one month. Except for PI-432432 which appeared to start a little slower, all rhizomes that would sprout had produced shoots in two months. Afterwards additional stems were produced from each rhizome until frost. The two accessions with the most stems and best stem/rhizome ratio in November were PI-432430 and PI-432432.

The March 1984 evaluation reflected the results of an unusually cold winter. In the morning of December 25, 1983, the temperature plunged to -2° F and the ground remained frozen for about two weeks (Coffeeville PMC, 1983). For all accessions, some rhizomes never produced sprouts in the spring, but PI-432420 and PI-432430 suffered more with more than 30 percent mortality. Overall, the rhizomes in the inverted position appeared to suffer most and normal the least, but no clear relationship was established. For some accessions, damage was greater at other positions. The March 3 evaluation showed the accession with the best rhizome survival to be PI-432429, but PI-432432 had the best stem production.

Conclusion

Rhizomes of giant reed do not have to be planted carefully in a specific position. Although planting in abnormal positions retarded stem emergence, the differences became less apparent with time. Rhizomes in some positions for some accessions were damaged more by sub-zero temperatures, but no positive relationship was firmly established because of much variability. Two accessions, PI-432429 and PI-432432, made the best recovery in the spring. In the previous fall, the two best accessions were PI-432430 and PI-432432, PI-432432 continued to perform best in the spring although it appeared to slightly more susceptible to freezing than PI-432429.

References

- Coffeeville PMC. 1982a. Annual Technical Report 1981-1982. pp. 155-156, 169-171, 173.
- Coffeeville PMC, 1982b. Project 28A282E: Plan for Selection and Release of a Superior Variety of Giant Reedgrass, Anudo donax.
- Coffeeville PMC. 1983. Report of Activities.
- Coffeeville PMC. 1987. Technical Notes No. 3. Advanced Evaluations of Giant Reed: I. Results of the Monthly Planting Study.

TABLE I. SHOOT PRODUCTION OF FOUR ACCESSIONS OF ARUNDO ON FIVE DATES
(From Ten Rhizomes Planted 5/18/83 in Four Positions)

PI NO.	Date	POSITION											
		Normal			Inverted			Up			Down		
		R	S	S/R	R	S	S/R	R	S	S/R	R	S	S/R*
432420	06/13/83	7	13	1.86	3	3	1.00	6	8	1.33	3	3	1.00
	07/13/83	9	34	3.78	9	22	2.44	6	15	2.50	6	14	2.33
	08/15/83	9	86	9.56	9	64	7.11	6	32	5.33	6	42	7.00
	11/17/83	9	199	22.11	9	178	19.78	6	98	16.33	6	145	24.17
	03/08/84	6	130	21.67	2	15	7.50	6	164	27.33	2	22	11.00
432429	06/13/83	6	7	1.17	6	8	1.33	7	9	1.29	4	5	1.25
	07/13/83	8	34	4.25	9	21	2.33	9	33	3.67	9	29	3.22
	08/15/83	8	56	7.00	9	64	7.11	9	67	7.44	9	55	6.11
	11/17/83	8	149	18.62	9	129	14.33	9	145	16.11	9	154	17.11
	03/08/84	5	60	12.00	7	64	9.14	9	160	17.78	7	65	9.29
432430	06/13/83	4	8	2.00	4	4	1.00	6	10	1.67	5	5	1.00
	07/13/83	6	23	3.83	7	21	3.00	6	32	5.33	9	23	2.56
	08/15/83	6	48	8.00	7	62	8.86	7	63	9.00	9	54	6.00
	11/17/83	6	128	21.33	7	228	32.57	7	158	22.57	9	225	25.00
	03/08/84	4	88	22.00	2	17	8.50	4	93	22.25	9	253	28.11
432432	06/13/83	10	18	1.80	5	7	1.40	4	5	1.25	3	3	1.00
	07/13/83	10	57	5.70	8	30	3.75	7	21	3.00	9	31	3.44
	08/15/83	10	93	9.30	8	67	8.38	6	47	7.83	9	71	7.89
	11/17/83	10	259	25.90	8	175	21.88	6	108	18.00	9	168	18.67
	03/08/84	8	223	27.88	8	177	22.12	4	120	30.00	5	110	22.00

* R = Number of rhizomes per row showing stem emergence.
S = Number of stems per row.
S/R = Stem to rhizome ratio for each row.

TABLE 11. SHOOT PRODUCTION FOR SUPERIOR ARUNDOS PLANTED IN FOUR POSITIONS
(Average Number per Row of Ten for Five Dates)

Position	ACCESSION											
	432420			432429			432430			432432		
	R	S	S/R	R	S	S/R	R	S	S/R	R	S	S/R*
Normal	8.0	92.4	11.6	7.0	61.2	8.3	5.2	59.0	11.4	9.6	130.0	13.5
Inverted	6.4	56.4	8.8	8.0	57.2	7.2	5.4	66.6	12.3	7.4	91.2	12.3
Up	6.0	49.4	8.2	8.6	82.8	9.6	6.0	71.2	11.9	5.4	60.2	11.2
Down	4.6	45.2	9.8	7.6	61.6	8.1	8.6	112.0	13.0	7.0	76.6	10.9
Average	6.3	60.8	9.8	7.8	65.7	8.0	6.3	77.2	11.7	7.4	89.5	12.1

TABLE 111. SHOOT PRODUCTION FOR SUPERIOR ARUNDOS AT FIVE EVALUATION DATES
(Average Number per Row of Ten for the Four Positions)

Date	ACCESSION											
	432420			432429			432430			432432		
	R	S	S/R	R	S	S/R	R	S	S/R	R	S	S/R*
06/18/83	4.8	6.8	1.4	5.8	7.2	1.3	4.8	6.8	1.4	5.5	8.2	1.5
07/13/83	7.5	21.2	2.8	8.8	29.0	3.4	7.0	25.0	3.7	7.0	34.8	5.0
08/15/83	7.5	56.6	7.2	8.8	60.5	6.9	7.2	56.8	8.0	8.2	69.5	8.4
11/17/83	7.5	155.0	20.7	8.8	144.2	17.0	7.0	185.0	25.4	8.2	177.5	21.5
03/08/84	4.0	22.8	20.7	7.0	87.2	12.0	4.8	112.8	20.2	6.2	157.5	25.2

* R = Number of rhizomes per row showing stem emergence.
S = Number of stem per row.
S/R = Stem to rhizome ratio for each treatment.