

TECHNICAL NOTES

COFFEEVILLE PLANT MATERIALS CENTER

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ADVANCED EVALUATIONS OF GIANT REED:

I. RESULTS OF THE MONTHLY PLANTING STUDY

Abstract

Rhizomes of giant reed were planted monthly for one year. Most rapid growth was made for the June planting, but stems grew almost as fast from those planted any time from April to September. If quick soil protection is not necessary, the rhizomes may be planted any time that the weather is favorable.

Introduction

Giant reed (Arundo donax L.) is a perennial, clump-forming, warm-season grass that is a native of Europe. It is one of the most spectacular grasses. It has a height of 2 to 6 meters and produces many plumelike terminal panicles that may be 60 centimeters long. The tough rinds of the culms are used to make clarinet reeds and organ pipes in Europe and for lattices, screens, mats, and construction of adobe huts in the southwest. It, including its white-striped variety versicolor, is frequently cultivated for an ornament in the southern states. The seedheads are sterile and reproduction is from thick, knotty rhizomes. It will survive as far north as Maryland and Iowa although the foliage is killed by freezing. It occurs along irrigation ditches from Texas to California and is used to prevent wind erosion in Texas (Hitchcock, 1950).

At the Coffeeville Plant Materials Center (PMC), fourteen accessions of giant reed were planted in 1976 in an assembly of 180 accessions to be evaluated for streamchannel and shoreline erosion control (Coffeeville PMC, 1976). All giant reed accessions were evaluated initially in rows at the Center from 1976 through 1981. During this period, two accessions were placed in the inundation basin at the Center and in a field evaluation planting at Winnsboro, Louisiana. In the inundation basin, the accessions survived in a foot (31 centimeters) of water during the 1979-80 evaluation period, but by the end of 1980, the plants were drastically weakened and grew only about half that of those not inundated. At Winnsboro, the plants survived in the high-sodium soil but made only half the normal growth. In both situations, PI-432420 outgrew PI-432427. In 1982, 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:

PI-Number	MS-Number	Origin
432420	4083	Collected in Yalobusha Co., MS by B. B. Billingsley, Jr.
432429	4198	Obtained from the Knox City PMC.
432430	4199	Obtained from the Knox City PMC.
432432	4364	Collected in Cuthbert, GA, by James P. Bradley.

Plans for advanced evaluation were developed in 1982 (Coffeerville PMC, 1982b), and studies were initiated to determine how different planting conditions affected establishment of the four accessions from rhizomes so planting guides could be prepared and for other information. The first of these studies was to determine survival at different planting depths. The four accessions were planted at depths of 0, 3, 5, 7, and 12 inches (0, 7.5, 12.5, 17.5, and 30 centimeters). Best overall stem production was obtained at the 5-inch depth, but it did not differ significantly from the 3 and 7-inch depths. PI-432432 had the best average survival, but an analysis of variance showed the difference between the accessions to not be significant. Over half of the rhizomes produced stems and survived at the surface and when buried at a depth of 12 inches indicating that a good stand may be obtained when rhizomes are exposed to the surface or covered deeper than normal by sediment in actual eroding streambank situations (Coffeerville PMC, 1982a).

In 1982, another study was initiated to determine how establishment might be affected when the rhizomes were planted at different periods throughout the year. This is a report for that study.

Materials and Methods

In this study, information gathered in the depth study was used. The accession with the best average, PI-432432, was used and planted at a depth of 5 inches. Each month beginning in October of 1982, freshly dug rhizomes were planted in the PMC advanced evaluation area in Oaklimer silt loam (0-2% slope) that had been pulverized and made weed-free. One row of 25 rhizomes was planted in each of the two blocks (A and B) each month. The rows were arranged sequentially by month in block A and randomized in block B. Dates for planting were:

10/06/82 (OCT)	02/08/83 (FEB)	06/09/83 (JUN)
11/09/82 (NOV)	03/08/83 (MAR)	07/07/83 (JUL)
12/08/82 (DEC)	04/12/83 (APR)	08/12/83 (AUG)
01/07/83 (JAN)	05/10/83 (MAY)	09/13/83 (SEP)

Evaluations consisted of recording the number of rhizomes with emerged shoots (R) and the number of shoots produced in each row (S) at monthly intervals from November 1982 to November 1983. During the winter when stems were dead, no evaluations were made. Evaluation dates were as follows:

11/12/82 (N-82)		
03/07/83 (MAR)	06/13/83 (JUN)	09/13/83 (SEP)
04/19/83 (APR)	07/15/83 (JUL)	10/27/83 (OCT)
05/23/83 (MAY)	08/15/83 (AUG)	11/17/83 (N-83)

Results and Discussion

Table I shows the number of living rhizomes and stems counted throughout the evaluation period. Data are missing for December through February because the shoots were absent or dead. In September and October, stems were too numerous to count, and for some months the rhizome count increased or decreased because the plants had spread so much that the rhizome source was difficult to locate. In April, evaluations for some rows in Block B were missing. For Tables 11 and 111, values for the missing months were determined by interpolation.

This test showed respectable survival for giant reed rhizomes planted throughout the year. Even in the winter, some rhizomes sprouted during warm periods, but the shoots were killed when freezing returned. Most rhizomes with tops killed survived and produced stems in the spring. While some rhizomes may have died from freezing accounting for the lower survival in winter plantings, some may have suffocated from standing water where loose soil settled after planting.

Stem emergence and growth was most rapid in the summer. From May through September essentially all rhizomes had sprouted in less than one month. June, with over half showing leaves in four days, appeared to be the month with most rapid growth and highest stem:rhizome ratio after one and two months (Table II). This relationship is shown graphically in Figure 1.

Although stem production was dependent on the month planted as well as the season of the year, there was little difference in the number of stems at the end of the growing season for rhizomes planted prior to August.

Conclusion

June appeared to be the best month for planting rhizomes of giant reed, but growth will be almost as rapid when planted from April to September. In the Coffeerville PMC service area, the rhizomes may be planted any month that weather permits, but those planted from October through February will provide little or no soil protection in the winter.

References

- Coffeerville PMC. 1976. Project 281176E: Initial Evaluation of Plants for Streamchannel and Shoreline Erosion Control.
- Coffeerville PMC. 1982a. Annual Technical Report 1981-1982. pp. 155-156, 169-171, 173.
- Coffeerville PMC. 1982b. Project 28A282E: Plan for Selection and Release of a Superior Variety of Giant Reedgrass, Arundo donax.
- Hitchcock, A. S. 1950. Manual of the Grasses of the United States. Second Edition revised by Agnes Chase, USDA Misc. Publ. No. 200.

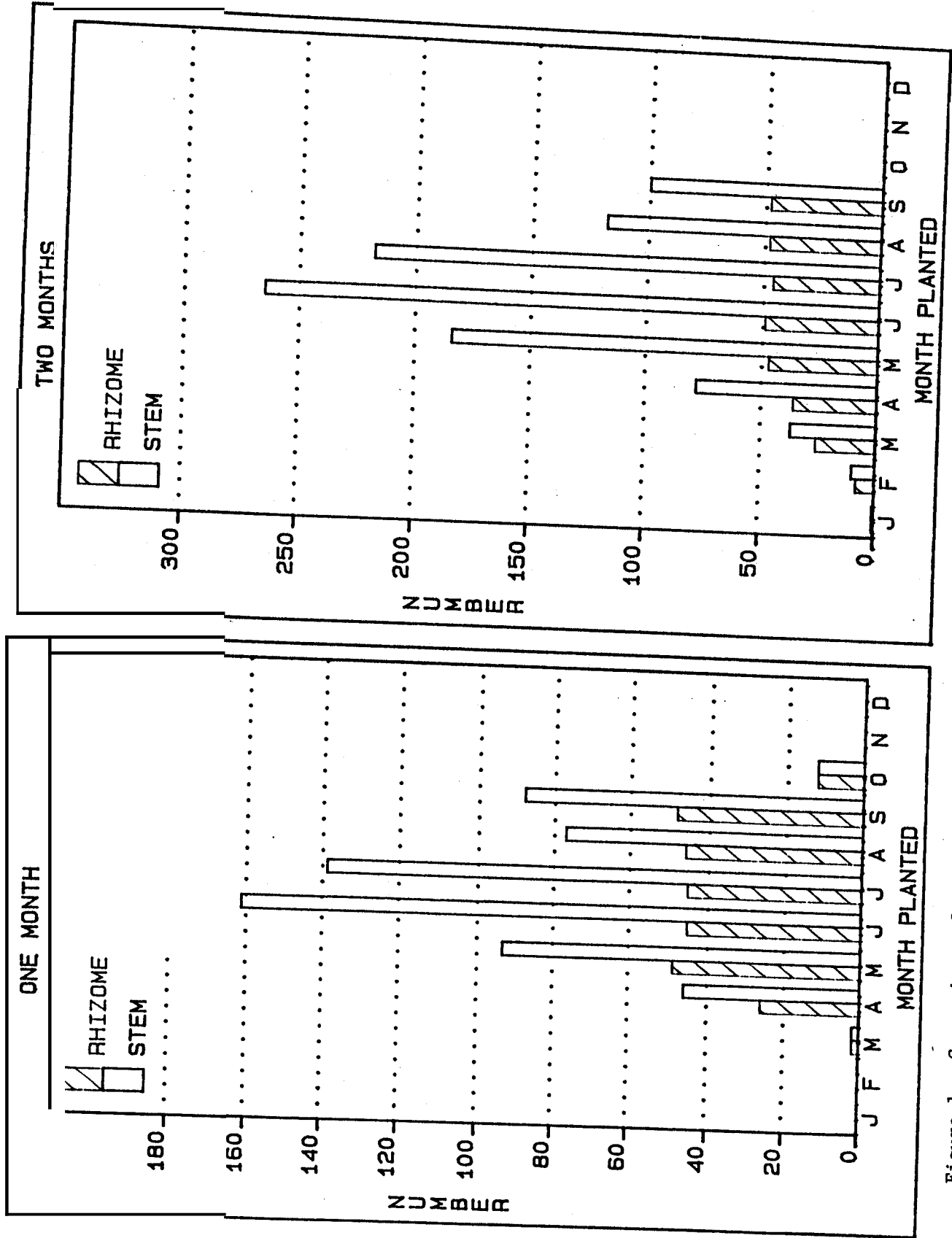


Figure 1. Comparison of survival (RHIZOME) and tillers (STEM) produced for 50 rhizome of giant reed planted monthly at the Coffeenville PMC. Graphs are for counts made one and two months after planting.

TABLE I. MONTHLY RHIZOME AND STEM COUNTS FOR TWO BLOCKS (A & B) OF
GIANT REED (PI-432432) PLANTED MONTHLY AT THE COFFEEVILLE PMC
(October 1982 to September 1983)

	N-82		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		N-83	
	R	S	R	S	R	S	R	S	R	S	R	S	R	S	R	S	R	S	R	S
Planting																				
OCT																				
JAN	**	**	0	0	**	**	16	25	19	55	20	120	17	151	**	**	**	**	18	241
A	**	**	0	0	**	**	16	25	19	55	20	120	17	151	**	**	**	**	18	241
B			1	1	**	**	18	27	21	44	20	91	21	144	**	**	**	**	19	250
FEB															**	**	**	**		
A			0	0	**	**	17	24	18	58	18	120	17	170	**	**	**	**	17	224
B			0	0	**	**	12	18	15	29	16	75	18	125	**	**	**	**	16	306
MAR																				
A					1	1	10	15	14	30	15	64	14	97	**	**	**	**	13	119
B					3	3	16	31	22	48	20	109	22	159	**	**	**	**	21	249
MAY															**	**	**	**		
A							16	19	24	49	22	83	22	129	**	**	**	**	19	210
B							16	18	24	44	25	101	25	133	**	**	**	**	25	167
JUN															**	**	**	**		
A								13	13	23	72	24	129	**	**	**	**	21	219	
B								19	33	22	89	25	136	**	**	**	**	25	188	
JUL																				
A										4	4	25	68	22	112	**	**	21	189	
B										4	5	20	71	24	106	**	**	21	171	
AUG																				
A												0	0	22	37	23	68	23	75	
B												0	0	24	40	25	50	23	52	
SEP																				
A																	23	46	24	49
B																	25	43	25	51

R - Number of rhizomes showing living stems per row. *

S - Number of living stems per row. *

* From 25 rhizomes planted per row for Blocks A and B.

** Evaluation data not available.

TABLE II. RHIZOME AND STEM DATA FOR GIANT REED
ONE, TWO, AND SIX MONTHS AFTER PLANTING

Plant Date	One Month			Two Months			S/R	Days	Six Months			
	Days	R	S	S/R	Days	R			S	Days	R	S
Planting												
OCT	37	12	12	1.00				195	36*	81*	2.25*	
NOV								195	46	100	2.17	
DEC								187	47	121	2.57	
JAN					59	1	1	1.00	189	40	211	5.28
FEB	27	0	0		70	8*	10*	1.25*	188	35	295	8.43
MAR	42	2	2	1.00	76	26	37	1.42	190	40**	319**	7.98**
APR	41	26	46	1.77	62	36	78	2.17	198	34**	312**	9.18**
MAY	33	49	93	1.90	66	47	184	3.91	191	44	377	8.57
JUN	36	45	161	3.58	67	49	265	5.41				
JUL	39	45	139	3.09	68	46	218	4.74				
AUG	31	46	77	1.67	75	48	118	2.46				
SEP	45	48	89	1.85	66	49	100	2.04				

Values for missing data obtained by:

* Doubling the value of the existing block.

** Interpolation from data before and after.

TABLE III. EVALUATIONS FOR GIANT REED AT COFFEEVILLE PMC
IN AUGUST AND NOVEMBER 1983

Planting Month	August				November			
	Days	R	S	S/R	Days	R	S	S/R
OCT	313	45	346	7.69	407	46	435	9.46
NOV	279	45	345	7.67	373	46	407	8.85
DEC	250	46	309	6.72	344	38	443	11.66
JAN	220	39	295	7.76	314	37	491	13.27
FEB	188	35	295	8.43	282	33	530	16.06
MAR	161	40	326	8.15	255	38	310	8.16
APR	125	36	256	7.11	219	34	368	10.82
MAY	97	47	262	5.57	191	44	377	8.57
JUN	67	49	265	5.41	161	46	407	8.85
JUL	39	45	139	3.09	133	42	360	8.57
AUG	3	0	0		96	46	127	2.76
SEP					66	49	100	2.04

R - Number of living rhizomes from 50 planted.

S - Number of stems from all rhizomes.

S/R - Stem to rhizome ratio.