1984-1985

Annual Report

Postharvest Studies

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in

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Table of Contents

List of Tables

List of Figures

Introduction

The primary objective of the studies reported here was to increase our understanding of the postharvest behavior of promising seedling clones selected in the potato breeding and evaluation program. A secondary objective was to obtain more information on relationships between easily measured tuber characteristics, such as Dry Matter, ascorbic acid, enzymatic browning, etc. and blackspot and soft rot susceptibility.

I. Postharvest evaluation of promising clones grown in 1983.

Comparison of fall and spring observations.

The procedures used in this part of the study have been described in prior reports and therefore are not reported here.

Ascorbic Acid: The ascorbic acid content of the test clones measured in the fall (1983) and spring (1984) is shown in figure 1. All test clones and Centennial had significantly higher levels of ascorbic acid in the fall than Russet Burbank. All clones decreased to varying degrees in ascorbic acid during storage at 4°C (39°F). TC2-1 showed the least loss during storage and contained significantly more ascorbic acid after storage than Russet Burbank as well as most of the other clones.

Dry Matter: The dry matter content of the test clones in the fall (1983) and spring (1984) is shown in figure 2. Little change in dry matter occurred during storage. AC77652-1 had significantly lower dry matter than the other test clones and Russet Burbank but did not differ significantly from Centennial. AC77514-1 and TC2-1 were among the highest in dry matter content.

Blackspot: The blackspot observations in the spring 1984 following storage at 4°C (39°F) are summarized in Table 1. AC77652-1 and Centennial were lowest in blackspot susceptibility while A74212-1 was the most blackspot susceptible. The other clones were very similar to Russet Burbank in blackspot susceptibility. It should be noted that two levels of bruising were used and that the clones varied in response. Some clones, such as AC77652-1, A72685-2, and Russet Burbank did not show a larger blackspot index with the higher impact level, while others, in particular AD74135-1, showed a much larger index. On the average, the higher impact level resulted in more impacted loci discoloring, a larger spot volume and a darker color.

A comparative summary of the fall and spring blackspot observations is given in Table 2. (The complete fall blackspot data was given in the 1983-84 annual report.) Of particular interest is the difference between clones in blackspot response in the fall and spring. Most clones decreased in susceptibility with storage at 4°C (39°F). However, AC77514-1 and A74212-1 increased. AD74135-1 was extremely susceptible in the fall while decreasing to moderate susceptible in the spring. AC77652-1 and Centennial also showed a marked decrease in susceptibility. On the average, following storage at 4°C (39°F), fewer impact loci discolored, the volume of the spot and color of the spot was less. Possibly a modest change in cell turgidity may be a contributing factor to this decrease in susceptibility. However, it has been reported that moderate decreases in turgidity may increase rather than decrease blackspot susceptibility.

Soft Rot: A comparative summary of the fall and spring soft rot observations is shown in Table 3. The clones did differ significantly in soft rot susceptibility. However, the differences in susceptibility were not large. Overall TC2-1 was lowest in susceptibility and AD74135-1

was highest. A marked and highly significant decrease in susceptibility of all clones occurred between fall and spring. The percent decrease in susceptibility during storage at 4°C (39°F) was much greater when the inoculated tissue discs were incubated in air than when incubated in 8% CO_2. Most likely some change in tuber physiology was responsible. A possible loss in the pathogenicity of the bacteria may, most likely, be ruled out since some clones rotted more in the spring when assayed in 8% CO_2 than in the fall when assayed in air, eg. AD74135-1 and TC2-1. It should be noted, that assaying in 8% CO_2 resulted in significantly higher soft rot susceptibility than occurred in air.

Correlation Coefficients: A summary of the simple linear correlation coefficients between the various measurements made in fall and spring is shown in Table 4. The significance levels of the correlations are indicated with asterisks. Dry matter was significantly correlated with blackspot in only one of four comparisons; dry matter measured in the spring showed a significant and positive correlation coefficient of +.67 with blackspot (level 2) also measured in the spring. Blackspot (spring, level 2) was significantly correlated (+.62) with soft rot (air-spring). Soft rot (air-spring) was significantly and negatively correlated (-.67) with the percent potassium. Soft rot (8% CO_2 - fall) was significantly correlated (+.64) with ascorbic acid measured in the fall. Other significant and expected correlations were the following: dry matter - fall vs. dry matter - spring (+.90); blackspot fall - level 1 vs. blackspot fall - level 2 (+.86); blackspot spring - level 1 vs. blackspot spring level 2 (+.80). Of additional interest, and not expected, is that no significant correlations occurred between soft rot measurements such as fall versus spring or air versus 8% CO_2. Possibly this is due in part to the lack of any large extremes between clones in soft rot susceptibility.

Clone Condition After Storage: The general condition of the clones after 9 months of storage at 10°C (50°F) or 4°C (39°F) was as follows:

AC77514-1	10°C	severe shrivel, poor condition
	4°C	visible shrivel, just sprouting
TC 2-1	10°C	moderate shrivel, good condition
	4°C	slight shrivel, just sprouting
AD 74135-1	10°C	severe shrivel, poor condition, early blight
	4°C	slight shrivel, no sprouts
Centennial	10°C	severe shrivel, poor condition
	4°C	visible shrivel, fusarium
A 74212-1	10°C	moderate shrivel, early blight
	4°C	firm, good condition, no sprouts
A 72685-1	10°C	moderate shrivel, good condition
	4°C	firm, good condition, just sprouting
R. Burbank	10°C	moderate shrivel, good condition
	4°C	firm, good condition, just sprouting
AC 77652-1	10°C	moderate shrivel, early blight
	4°C	visible shrivel, early blight, no sprouts

II. Postharvest evaluation of promising clones grown in 1984:

Fall observations.

Enzymatic browning procedure: A procedure used in this phase of the research not reported earlier was that of comparing clones in respect to the rate of browning. This procedure was as follows. One 6 millimeter thick slice (either transverse or longitudinal) was taken from each tuber and placed in a low temperature freezer. After the slice was completely frozen, it was removed from the freezer and placed at room temperature in a humid atmosphere. Slice color was estimated 50, 75, 100 and 125 minutes after removal from the freezer. The color score was the total of the 4 readings. A reference slice for each clone was soaked in 5% sodium dithionite ($NA_2S_2O_4$) for 5 minutes prior to freezing to stop all

browning. Non treated frozen slices changed color progressively from white to dark brown. An arbitrary color rating from 0 to 5 was used to estimate color.

Ascorbic Acid: The ascorbic acid content of the 1984 test clones is shown in figure 3. Highly significant differences were found between clones. CO 7913 and Russet Burbank had the lowest ascorbic acid while CO 7920-3 and BC 9668-1 were highest.

Dry Matter: Dry matter content of the 1984 test clones also varied significantly (figure 4). CO 7920-3 was significantly higher in dry matter than all other clones. CO 7922-1 and AC 79100-1 were significantly higher in dry matter than R. Burbank while AC 79128-1, A 74133-1 and B 9668-1 were significantly lower. The difference in dry matter production between the highest and lowest clones if computed on the basis of 300 cwt per acre would be 8010 pounds per acre (CO 7920-3) versus 6555 pounds per acre (AC 79128-1). This difference of 1455 pounds per acre would be important if potatoes were used for processing but of much lesser importance if used fresh.

Blackspot: All clones except for CO 7920-3 were lower in blackspot susceptibility than Russet Burbank; CO 7920-3 was slightly more susceptible, (Table 5). A-74133-1 was the most blackspot resistant showing a mean index of 11 and CO 7920-3 was most susceptible with a mean index of 167.

Soft Rot: Soft rot susceptibility of the 1984 test clones is shown in figure 5 (incubated in air) and figure 6 (incubated in 8% CO_2). It should be noted that a great deal of variation in soft rot susceptibility existed within clones; this is indicated by the length of the vertical bar on either side of the short horizontal bar which indicates the mean value. Clones are significantly different if a horizontal line fails

to intersect any part of the vertical bars. Thus, when measured in air (figure 5), AC 79100-1 was significantly more soft rot susceptible than CO 7913-1, CO 7922-1 and A 74133-1 but not more susceptible than Russet Burbank and the other three test clones. When measured in 8% CO_2 (figure 6), AC 79100-1 was significantly more soft rot susceptible than 5 of the test clones, but not significantly different from Russet Burbank and BC 9668-1.

Enzymatic Browning: The results of the enzymatic browning evaluation are shown in figure 7. Russet Burbank showed significantly more browning than all test clones. BC 9668-1 had the lowest browning but did not differ significantly from 4 other clones. The reason for measuring browning was to determine if it could be used as a predictor of blackspot.

A summary of the linear correlation coefficients between the various factors is given in Table 6.

(At this time the potassium analyses are not finished so comparisons with potassium could not be made.) Few significant correlations were found. Blackspot - level one and two were highly correlated and soft rot in air and soft rot in 8% CO_2 were also highly correlated. Enzymatic browning did show a positive relationship with blackspot although not significant. Thus, the degree of slice browning is only one factor among perhaps several that are involved in blackspot development. It should be noted that ascorbic acid was negatively correlated with enzymatic browning although not significant. This would be expected since ascorbic acid, a reducing substance, can prevent or reduce the rate of browning which is, an oxidative process.

Weight Loss and Sprouting: Six carefully matched tubers of each test clone and Russet Burbank were weighed to the nearest 0.01 gram on

October 17, 1984 and placed in the dark at 23°C (73°F). Ten weighings were made between October 17 and December 21. Sprouts were removed and weighed after 40, 47, 54 and 61 days. The accumulative percent weight loss on each weighing is shown in Table 7. Significant differences between clones were found at each weighing. Among the test clones, only CO 7922-1 lost weight more rapidly than Russet Burbank on the first weighing. Subsequently, other clones lost significantly more weight until on the last weighing, the accumulated weight loss of each test clone was significantly greater than Russet Burbank. The pattern of weight loss for each test clone relative to Russet Burbank is shown in figure 8. It should be noted that sprout removal did not change the slope of the weight loss curve for any clone. The accumulated weight loss for each clone and Russet Burbank after 65 days is shown in figure 9. As stated above and shown in figure 9, all clones lost weight significantly more rapid than Russet Burbank.

The sprout growth after 40, 47, 54 and 61 days at 23°C (73°F) is shown in table 8. On the first weighing, all test clones had broken dormancy while Russet Burbank was still dormant. AC 79128-1 showed the shortest dormant period and thus produced the greatest sprout weight on the first weighing. The order of breaking dormancy would be inversely related to the weight of sprouts produced on November 26, after 40 days at 23°C (73°F). Thus, except for BC 9668-1, all test clones had a significantly shorter dormant period than Russet Burbank. The accumulated sprout weight after 61 days at 23°C (73°F) is shown in figure 10. This was closely related to the initial weighing at 40 days (r=0.89).

A linear correlation coefficient of 0.84 between total sprout weight and total weight loss was obtained. This suggests that 70% of the difference

in weight loss could be explained by sprouting. Since sprouts were removed before attaining a large size, the increased weight loss probably reflects a generally accelerated metabolism due to breaking dormancy and not water loss from the sprouts.

III Chipping and other characteristics of 4 seedling clones and Russet Burbank.

The four seedling clones all had WC 672-2 as one parent. The other parent was either WC 230-14, Lemhi (2 seedlings) or WC 316-1.

Each seedling clone, with the exception of CO 8061-1 produced significantly lighter chips than Russet Burbank. CO 8014-2 produced the lightest and most acceptable chips.

Two of the four clones (CO 8014-1 and CO 8014-2) had significantly higher specific gravity than Russet Burbank. All clones contained more dry matter than Russet Burbank but only CO 8014-1 was significantly higher.

All clones showed less enzymatic browning than Russet Burbank and in most comparisons, the difference was significant. Blackspot was not serious on any clone nor on Russet Burbank.

IV. Enzymatic browning comparison of 27 seedling clones and 10 cultivars following 10 month storage.

The procedures used in this study were the same as described under section II. The objective was to determine the range in enzymatic browning of frozen and thawed tuber slices that may exist among breeding clones. As shown in Table 10, enzymatic browning ranged from a low index of 3 (WNC 618-9) to a high index of 15(Targhee). Nine clones had higher enzymatic browning than Russet Burbank and 27 showed equal or less browning. Although

a significant correlation between enzymatic browning and blackspot has not been found in prior studies, it may be hypothesized that crosses of high browning clones would produce a higher percentage of blackspot susceptible progeny than progeny of low browning clones. In other words clones with a high browning potential should be used with caution in the breeding program. Further work with these and other clones is planned. From the basic research standpoint we hope to determine why clones do vary so widely in enzymatic browning.

V. Pathogenicity comparison of two selections of the same line of Erwinia carotovora var. Atroseptica on 3 potato cultivars.

Prior to evaluating clones for soft rot susceptibility the pathogenicity of the bacteria is evaluated. The strain (J-10) used for this purpose over several years was obtained from Plant Pathology and is stored at $2^{o}C$ on nutrient agar slants.

Prior to use the culture is routinely transferred twice to new agar slants and checked for pathogenicity. This past fall, the culture appeared to be somewhat less aggressive. To determine its aggressiveness, a more recent selection was obtained from pathology and the pectolytic activity of the two selections and their pathogenicity on 3 cultivars were compared in a replicated experiment. Two cultivars, Sangre and Lemhi, had shown considerable susceptibility and the susceptibility of the third cultivar, Nooksack, was unknown.

Both selections showed good pectolytic activity. The pathogenicity results are shown in figure 11. The two selections did not differ significantly in pathogenicity on the 3 cultivars when assayed in air. However, when assayed in 8% CO_2 the more recent selection obtained from plant pathology

was significantly more aggressive on Nooksack, the most resistant of the 3 cultivars, and on Lemhi, a susceptible cultivar. However, no difference between selections was observed on Sangre, also a very susceptible cultivar.

This observation illustrates the desirability to evaluate soft rot susceptibility in different atmospheres. Under storage conditions or in the soil, carbon dioxide may increase and thus increase the tuber susceptibility and/or the aggressiveness of the pathogen. Also, of interest was that two selections of the same bacterial strain responded somewhat differently in the presence of carbon dioxide.

Summary

The following seedling clones were evaluated in the fall 1983 and in April, 1984, after storage at 4°C (39°F): A 72685-2, AC 77652-1, AC 77514-1, TC 2-1, AD 74135-1 and A 74212-1. Comparisons were made with Russet Burbank and Centennial. Factors evaluated were ascorbic acid content, dry matter content, potassium content, blackspot susceptibility, and soft rot susceptibility. AC 77652-1 and Centennial were lowest in blackspot susceptibility, while A 74212-1 was most blackspot susceptible. Some clones decreased in blackspot susceptibility with storage while others increased.

The clones did not differ in soft rot susceptibility. Overall, TC2-1 was lowest in susceptibility and AS 74135-1 was highest.

AC 77652-1 had significantly lower dry matter than all other test clones and Russet Burbank but did not differ significantly from Centennial. AC 77514-1 and TC 2-1 were among the highest in dry matter content. TC 2-1 contained significantly more ascorbic acid after storage than Russet Burbank and most of the other clones.

The following seedling clones were evaluated in the fall of 1984: CO 7913-1, CO 7920-3, CO 7922-1, AC 79100-1, AC 79128-1, A 74133-1, BC 9668-1. Comparisons were made with Russet Burbank. Factors evaluated were ascorbic acid content, dry matter content, blackspot susceptibility, soft rot susceptibility, enzymatic browning, weight loss and sprout growth. Highly significant differences existed between clones in ascorbic acid content. CO 7913 and Russet Burbank were lowest while CO 7920-3 and BC 9668-1 were highest. Dry matter also differed significantly between clones. CO 7920-3 was significantly higher in dry matter than all other clones. The difference in dry matter production between the highest and

lowest dry matter clones, assuming 300 cwt per acre yield, would be 8010 pounds per acre for CO 7920-3 versus 6555 pounds per acre for AC 79128-1. This would be significant to processors.

All clones except CO 7920-3 were lower in blackspot susceptibility than Russet burbank. A 74133-1 was most resistant.

AC 79100-1 was significantly more soft rot susceptible than some of the other clones, but not more susceptible than Russet Burbank.

All clones showed significantly less enzymatic browning than Russet Burbank. BC 9668-1 showed the lowest degree of browning.

All clones broke dormancy earlier and lost weight more rapidly under room temperature and low humidity conditions than Russet Burbank. CO 7922-1 showed the highest rate of weight loss and AC 79128-1 had the shortest dormant period.

The chipping potential of 4 seedling clones having WC 672-2 as a common parent was evaluated. CO 8014-2 (WC 672-2 x Lemhi) had the most acceptable chips and the highest specific gravity. All clones showed less enzymatic browning than Russet Burbank and low blackspot susceptibility when bruised at 10°C (50°F).

Twenty seven seedling clones and 10 named cultivars were evaluated for enzymatic browning potential. Nine clones darkened more intensely than Russet Burbank and 27 darkened less.

The pathogenicity of two selections of one line of Erwinia carotovora, var. Atroseptica was compared on 3 cultivars; Nooksack, Sangre, and Lemhi. The two selections did not differ when assayed in air, but did differ when assayed in 8% CO_2.

Table 1 Blackspot evaluation summary of 6 seedling clones and 2 cultivars in the spring, 1984 after 7 months storage at 4°C (39°F).

Cultivar/Level[a]		%LOCI SHOWING COLOR			MEAN VOLUME OF SPOT			COLOR			MEANS				MEAN
		Stem	MID	BUD	STEM	MID	BUD	STEM	MID	BUD	%LOCI	VOLUME	COLOR	INDEX[b]	INDEX
A72685-2	1	75	38	25	484	153	33	2.3	1.3	1.0	46	343	1.8	83	
	2	100	25	0	247	370	0	1.9	2.0	0	42	262	1.8	76	80
R. Burbank	1	75	50	0	288	97	0	2.2	1.7	0	42	204	1.9	80	
	2	75	13	13	531	59	445	2.7	1.0	3.0	33	428	2.4	79	80
AC77652-1	1	0	13	0	0	79	0	0	2.0	0	4	79	2.0	8	
	2	25	0	0	231	0	0	1.0	0	0	8	231	1.0	8	8
AC77514-1	1	75	38	13	205	191	98	1.7	1.3	1.0	42	170	1.4	59	
	2	88	50	25	514	438	184	2.4	2.3	2.5	54	437	2.4	130	95
TC2-1	1	13	38	75	63	155	99	2.0	2.0	1.5	42	131	1.6	67	
	2	25	75	88	154	114	132	1.5	1.3	1.4	63	102	1.4	88	78
AD74135-1	1	0	13	25	0	38	115	0	1.0	2.0	13	89	2.0	26	
	2	63	50	13	232	495	628	2.6	2.5	3.0	42	378	2.6	109	68
Centennial	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
	2	25	13	0	59	115	0	1.0	2.0	0	13	77	1.3	17	9
A74212-1	1	38	38	88	53	40	127	2.3	1.7	2.6	54	97	2.4	130	
	2	75	63	75	345	402	466	2.5	2.8	3.2	71	375	2.7	192	161
Means	1	35	29	28	137	94	59	1.3	1.4	1.0	30	139	1.6	57	
	2	59	36	27	289	249	232	1.9	1.7	1.6	41	286	1.9	87	

Measurement	Level	F Value	Required F .05	Required F .01
% Loci Showing Color	(1)	2.11	2.66	4.03
	(2)	1.66	2.66	4.03
Mean Volune of Spot	(1)	1.49	2.66	4.03
	(2)	3.04	2.66	4.03
Mean Color	(1)	2.49	2.66	4.03
	(2)	4.84	2.66	4.03

[a]Level 1 = 100 grams dropped 45 cm.
Level 2 = 150 grams dropped 45 cm.

[b]Index = mean % Loci x mean color.
maximum possible = 300

Table 2. Blackspot evaluation summary of 6 seedling clones and 2 cultivars in the fall 1983 (after harvest) and spring 1984 (after 7 months storage at 4°C (39°F).

Clone	Level[a]	% Loci		Volume		Color		Index		Mean Index (Levels 1 & 2)	
		F '83	S '84	F '83	S '84	F '83	S '84	F '83	S '84	F	S
A72685-2	1	42	46	438	343	2.0	1.8	84	83		
	2	63	42	953	262	2.3	1.8	145	76	115	80
R. Burbank	1	21	42	344	204	2.0	1.9	42	80		
	2	50	33	481	428	2.5	2.4	125	79	84	80
AC77652-1	1	17	4	431	79	2.0	2.0	34	8		
	2	54	8	489	231	2.5	1.0	135	8	85	8
AC77514-1	1	29	42	196	170	1.0	1.4	29	59		
	2	71	54	479	437	1.9	2.4	135	130	82	95
TC2-1	1	29	42	216	131	1.8	1.6	52	67		
	2	88	63	273	102	1.7	1.4	150	88	101	78
AD74135-1	1	75	13	932	89	3.0	2.0	225	26		
	2	96	42	1641	378	3.0	2.6	288	109	257	68
Centennial	1	50	0	387	0	2.5	0	125	0		
	2	71	13	623	77	2.0	1.3	142	17	134	9
A74212-1	1	54	54	297	97	2.0	2.4	108	130		
	2	54	71	402	375	2.5	2.7	135	192	122	161
		—	—	—	—	—	—	—	—		
Mean	1	40	30	405	139	2.0	1.6	87	57		
	2	68	41	668	286	2.3	1.9	157	87	123	72

[a]Level 1 = 100 grams dropped 45 cm.
[a]Level 2 = 150 grams dropped 45 cm.

[b]Index = % loci discolored x mean color
maximum possible = 300

Table 3. Soft rot susceptibility indices of 6 seedling clones and 2 cultivars observed in the fall 1983 (after harvest) and spring 1984 (after 7 months storage at 4°C (39°F).

	Fall		Spring		Means				
Cultivar	Air	CO_2	Air	CO_2	Fall	Spring	Air	CO_2	Mean
A72685	185	189	6	104	187	55	96	146	121
R. Burbank	136	161	16	130	149	73	76	146	111
AC77652-1	191	188	34	135	190	84	113	161	137
AC77514-1	191	181	27	135	186	81	109	158	133
TC2-1	81	181	9	125	131	67	45	153	99
AD74135-1	145	192	51	173	168	112	98	182	140
Centennial	146	199	3	81	173	42	75	140	107
A74212-1	113	194	62	95	153	79	87	144	115
Mean	149	186	26	122	167	74	87	154	120

		Required F Value	
Factor	F Value	0.05	0.01
Clone	2.25	2.08	2.79
Season	172	3.92	6.84
Atmosphere	88.4	3.92	6.84
C x S	2.15	2.08	2.79
C x A	1.08	2.08	2.79
S x A	17.36	3.92	6.84

Table 4. Summary of correlation coefficients between various factors measured on 6 seedling clones and 2 cultivars in the fall 1983 (after harvest) and spring 1984 (after 7 months storage at 4°C (39°F).

	DM-F	DM-S	BS-F1	BS-F2	BS-S1	BS-S2	SR-AF	SR-AS	SR-CF	SR-CS	AA-F	AA-S	%K
DM-F		+.90***	0	+.24			-.28		-.16		+.26		-.10
DM-S					+.52	+.67*		+.08		+.40		+.40	-.12
BS-F1				+.86***	-.19	+.17	-.18		+.55		+.22		-.53
BS-F2					-.30	+.13	-.07		+.29		+.21		-.37
BS-S1						+.80**		+.28		-.24		+.06	-.32
BS-S2								+.62*		+.07		+.21	-.58
SR-AF								-.06	+.09	+.13	+.29		+.17
SR-AS							-.06		+.24	+.37		-.29	-.67
SR-CF							+.09	+.24		-.32	+.64*		-0.0
SR-CS							+.13	+.37	-.32			-.22	-.16
AA-F												+.48	+.15
AA-S													+.23

Significance Levels

0.1 = >0.62*
0.05 = >0.71**
0.01 = >0.83***

Code:

DM-F	Dry matter, fall	SR-AF	Softrot, air, fall
DM-S	Dry matter, spring	SR-AS	Softrot, air, spring
BS-F1	Blackspot, fall, level 1	SR-CF	Softrot, 8% CO_2, fall
BS-F2	Blackspot, fall, level 2	SR-CS	Softrot, 8% CO_2, spring
BS-S1	Blackspot, spring, level 1	AA-F	Ascorbic acid, fall
BS-S2	Blackspot, spring, level 2	AA-S	Ascorbic acid, spring

Table 5. Blackspot evaluation of 7 seedling clones and one cultivar in the fall, 1984.

Cultivar	Level[a]	%Loci showing color			Mean Volume of Spot			Color			Means			Index[b]	Mean Index
		Stem	Mid	Bud	Stem	Mid	Bud	Stem	Mid	Bud	%Loci	Volume	Color		
CO7913-1	1	50	0	0	174	0	0	1.7	0	0	17	174	1.7	29	
	2	50	50	38	195	140	53	1.7	1.7	1.7	46	133	1.7	77	53
CO7920-3	1	38	50	50	296	168	120	3.0	3.0	2.3	46	184	2.7	124	
	2	88	63	75	282	382	290	2.6	2.8	3.0	75	312	2.8	210	167
CO7922-1	1	13	13	0	314	339	0	3.0	3.0	0	9	327	3.0	27	
	2	25	0	0	221	0	0	2.5	0	0	8	221	2.5	20	23
AC79100-1	1	13	0	0	302	0	0	3.0	0	0	4	302	3.0	13	
	2	38	25	25	106	343	327	2.3	3.0	3.5	29	198	2.7	78	47
AC79128-1	1	25	0	0	55	0	0	3.0	0	0	8	55	3.0	25	
	2	50	38	50	124	216	228	1.8	2.3	2.0	46	171	1.9	87	56
A74133-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
	2	25	13	13	39	85	13	1.0	2.0	2.0	17	39	1.3	22	11
BC9668	1	25	0	0	196	0	0	2.5	0	0	8	196	2.5	21	
	2	38	38	13	301	162	269	2.0	2.0	2.0	29	281	2.1	61	41
R. Burbank	1	50	38	38	196	148	252	1.7	3.7	2.0	42	200	2.4	101	
	2	63	50	63	202	435	520	3.0	3.3	3.6	58	366	3.2	186	144
Means	1	27	13	11	192	82	47	2.2	1.2	0.5	17	180	2.3	43	
	2	47	35	35	184	220	213	2.1	2.1	2.2	39	215	2.3	93	

Measurement	Level	F Value	Required F .05	Required F .01
%Loci Showing Color	1	5.02	2.66	4.03
	2	14.1	2.66	4.03
Mean Volume of Spot	1	1.76		
	2	4.27		
Mean Color	1	1.70		
	2	5.26		

[a]Level 1 = 100 grams dropped 45 cm.
Level 2 = 150 grams dropped 45 cm.

[b]Index = mean % Loci x mean color.
maximum value = 300.

Table 6. Summary of correlation coefficients between various factors measured on 7 seedling clones and one cultivar in the fall, 1984.

	DM	BS-1	BS-2	SR-A	SR-CO_2	AA	EnzB	K^+
DM		+.60	+.48	+.23	+.14	+.45	+.15	
BS-1			+.94***	+.30	+.16	0.0	+.34	
BS-2				+.34	+.35	-.17	+.33	
SR-A					+.87***	+.25	+.10	
SR-CO_2						+.17	+.37	
AA							-.36	
Enz B								

Significance Prob.		Required
0.1	=	>0.62*
0.05	=	>0.71**
0.01	=	>0.83***

Code:

- DM = Dry matter
- BS-1 = Blackspot, level 1
- BS-2 = Blackspot, level 2
- SR-A = Soft rot, air
- SR-C = Soft rot, 8% CO_2
- AA = Ascorbic acid
- EnzB = Enzymatic browning

Table 7. Accumulative percent weight loss of 7 seedling clones and one cultivar after various time periods at 23°C (fall, 1984).

	Number of Days and Date									
Clone	5 10/22[a]	9 10/26	12 10/29	19 11/5	26 11/12	34 11/20	40 11/26	47 12/3	58 12/14	65 12/21
CO 7913-1	.98	1.54*[b]	1.91*	2.74*	3.49*	4.63*	5.87*	7.72*	11.39*	14.01*
CO 7920-3	.78	1.19	1.47	2.08	2.60	3.25	3.81	4.76*	6.67	7.90*
CO 7922-1	1.11*	1.75*	2.21*	3.22*	4.54*	6.30*	7.62*	9.91*	13.45*	15.64*
AC 79100-1	.84	1.28	1.60	2.31	3.12*	4.12*	5.03*	6.64*	9.61*	11.56*
AC 79128-1	.70	1.02	1.26	1.89	2.80	4.05*	5.19*	7.79*	11.17*	13.65*
A 74133-1	.75	1.13	1.40	2.01	2.80	3.91*	4.81*	6.77*	9.81*	12.17*
BC 9668	.98	1.49	1.83*	2.56*	3.11*	3.75*	4.30	5.05*	7.11*	8.50*
R. Burbank	.82	1.22	1.49	2.05	2.53	3.06	3.49	3.85	5.80	6.62
$\bar{x}$	.87	1.33	1.64	2.36	3.13	4.13	5.01	6.56	9.38	11.26
$LSD_{.05}$	.16	.23	.29	.40	.50	.61	.74	.88	1.03	1.08

[a]Potatoes moved from 4°C to 23°C on 10/17/84. At this time 6 tubers of each clone were numbered and weighed to the nearest 0.01 gram. Individual tuber identity was maintained on subsequent weighings.

[b]Numbers marked with an asterick are significantly greater than the value for Russet Burbank.

Table 8. Weight of sprouts produced by 7 seedling clones and one cultivar during various time periods at 23°C (fall, 1984).

	Grams Per 100 Grams						
Clone	11/26[a]	12/3	Accum.	12/10	Accum.	12/17	Accum
CO 7913-1	.420(4)[b]	.363	.783	1.609	2.392	.837	3.228
CO 7920-3	.222(6)	.097	.319	.763	1.082	.326	1.408
CO 7922-1	.565(3)	.124	.689	1.240	1.929	.484	2.413
AC 79100-1	.397(5)	.228	.625	1.168	1.793	.407	2.199
AC 79128-1	1.119(1)	.356	1.475	1.635	3.110	.497	3.607
A 74133-1	.622(2)	.334	.956	1.404	2.360	.688	3.047
BC 9668-1	.014(7)	.144	.158	.745	.903	.421	1.324
R. Burbank	0(8)	.077	.077	.537	.614	.302	.915
$\bar{X}$	.420	.215	.635	1.138	1.773	.495	2.268
$LSD_{.05}$	.132	.155	.120	.247	.266	.240	.367

[a]Tubers moved from 4°C to 23°C on 10/17/74.

[b]Order of breaking dormancy.

Table 9. Chipping and other characteristics of 4 seedling lines and the Russet Burbank cultivar measured in the fall, 1984.

Clone	Chip Color[a] 10/2/84[b]	10/16/84[b]	12/17/84[c]	Specific Gravity	% Dry Matter	Enzymatic[d] Browning 10/12/84	12/17/84	Blackspot[e] 12/17/84
CO 8048-1 (WC 672-2 x WC 230-14)	5.8	5.4*	5.7*	1.089	23.3	3.3*	2.6*	Lev 1 0 Lev 2 76
CO 8014-2 (WC 672-2 x Lemhi)	3.7*	3.9*	3.3*	1.094*	24.4	4.7*	4.0*	Lev 1 14 Lev 2 33
CO 8014-1 (WC 672-2 x Lemhi)	5.1*	5.6*	5.3*	1.092*	25.9	5.3*	6.0	Lev 1 21 Lev 2 68
C) 8061-1 (WC 672-2 x WC 316-1)	7.9	7.4	8.6	1.083	25.1	6.0*	3.2*	Lev 1 0 Lev 2 0
R. Burbank	6.7	6.9	7.9	1.079	22.2	12.0	7.4	Lev 1 0
$LSD_{.05}$	.94	.88	.84	0.012	3.13	2.44	2.6	Lev 2 36

[a]Based on PCII chart 1-10 scale.

[b]Tubers halved longitudinally on 10/2/84 1/2 chipped immediately, 1/2 held at 23°C and chipped on 10/16/84.

[c]Stored at 9-10°C since 10/2/84.

[d]Total score of readings made 50, 75, 100, 125 minutes after removal of slices from freezer

[e]Maximum score = 400

Table 10. Browning indices of pre-frozen tuber slices of 27 seedling clones and 10 cultivars evaluated in August, 1984.

Clone	Type[a]	Browning[b] Index	Clone	Type	Browning Index	Clone	Type	Browning Index
WNC618-9	LR	3	WN245-2	OR	8	A7596-1	LR	12
Atlantic	RW	4	WN328-2	LR	8	WN330-1	LR	12
Oromonte	RW	5	WN451-2	RR	8	Lemhi	LR	12
BC9668	LR	6	Gold Rus.	LR	8	Allagash Rus.	OR	12
WNC654-13	LR	6	A6948-4	LW	9	Lenape	RW	12
WNC523-8	LR	7	AC7884-1	LR	9	B8934-4	OR	13
BC9289-1	LR	7	WN284-1	OR	9	Pioneer	R	13
TC2-1	LR	7	A503-42	RW	10	A72685-2	LR	14
AC77652-1	LR	7	WNC325-1	OR	10	Targhee	LR	15
AC71997-1	LR	8	Russette	OR	10	$LSD_{.05}$ = 2.3		
A66107-51	RR	8	A74212-1	LR	11			
AC7426-3	OR	8	AD74135-1	LR	11			
TND14-1	LR	8	AC77514-1	LR	11			
WNC686-3	RW	8	R. Burbank	LR	11			

[a]Type

LR = Long Russet
RW = Round White
RR = Round Russet
LW = Long White
R = Red
OR = Oblong Russet

[b]Summation of color estimates made on 6mm thick pre-frozen slices 50, 75, 100, and 125 minutes after removal from freezer. 0 = no color to 15 = dark brown or black.

Clone

1. A 72685-2
2. R. Burbank
3. AC 77652-1
4. AC 77514-1
5. TC 2-1
6. AD 74135-1
7. Centennial
8. A 74212-1

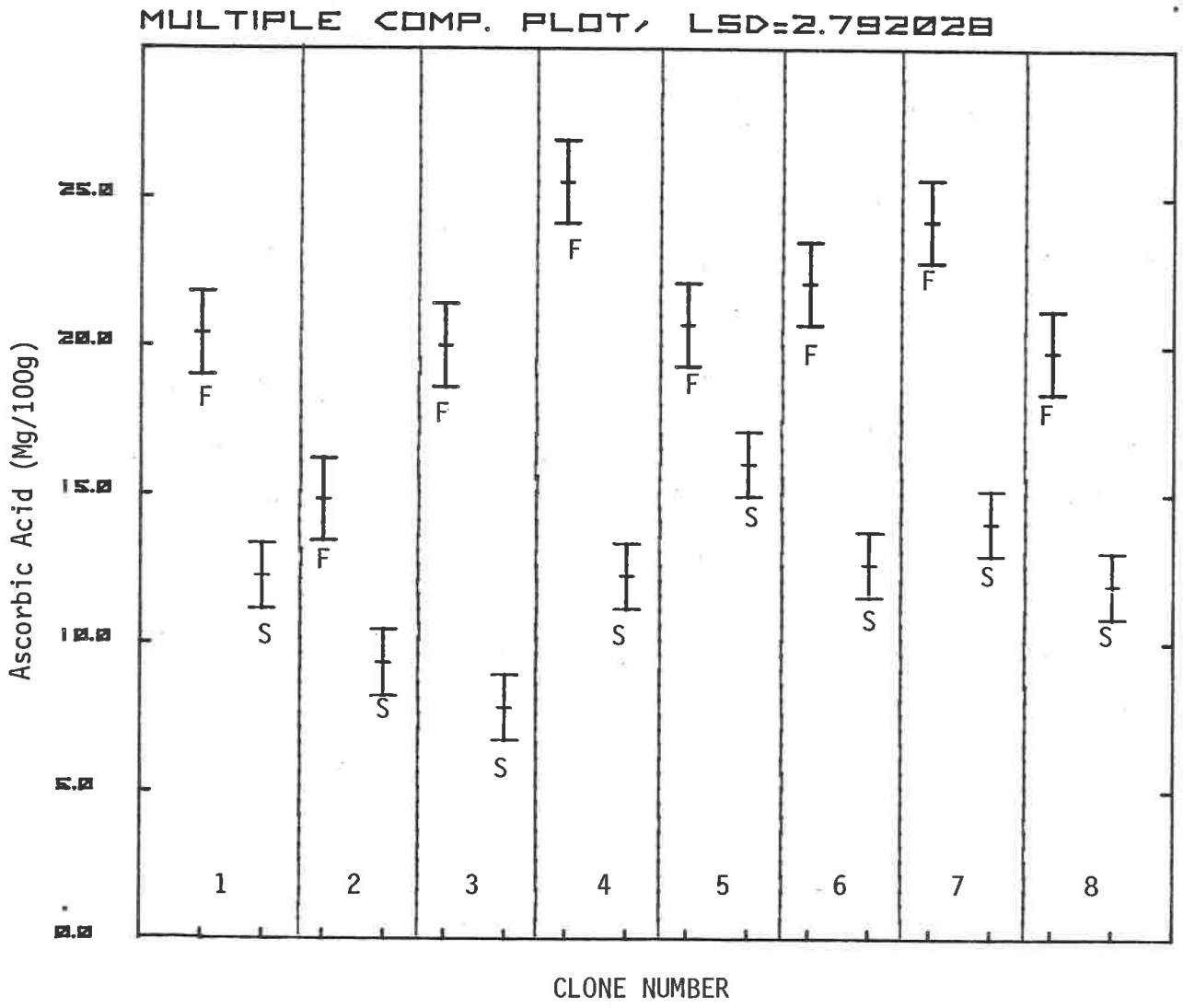

Figure 1. Ascorbic acid content measured in the fall, 1983 (F) and spring, 1984 (S) in 6 seedling clones and 2 cultivars.

Clone

1. CO 7913
2. CO 7920-3
3. CO 7922-1
4. AC 79100-1
5. AC 79128-1
6. A 74133-1
7. BC 9668-1
8. R. Burbank

Same as Figure 1

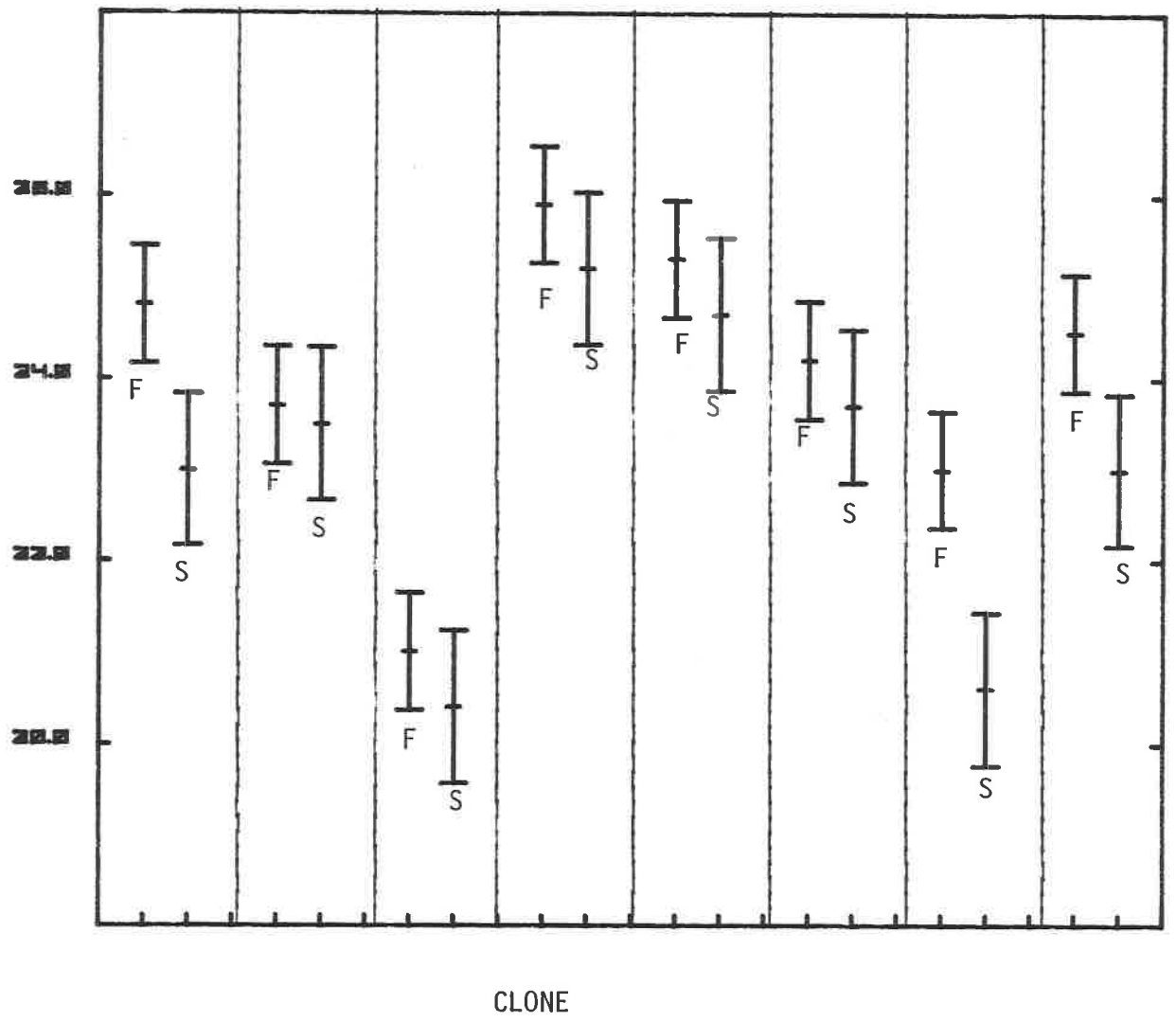

Figure 2. Percent dry matter measured in the fall, 1983 (F) and spring 1984 (S) in 6 seedling clones and 2 cultivars.

Clone

1. CO 7913
2. CO 7920-3
3. CO 7922-1
4. AC 79100-1
5. AC 79128-1
6. A 74133-1
7. BC 9668-1
8. R. Burbank

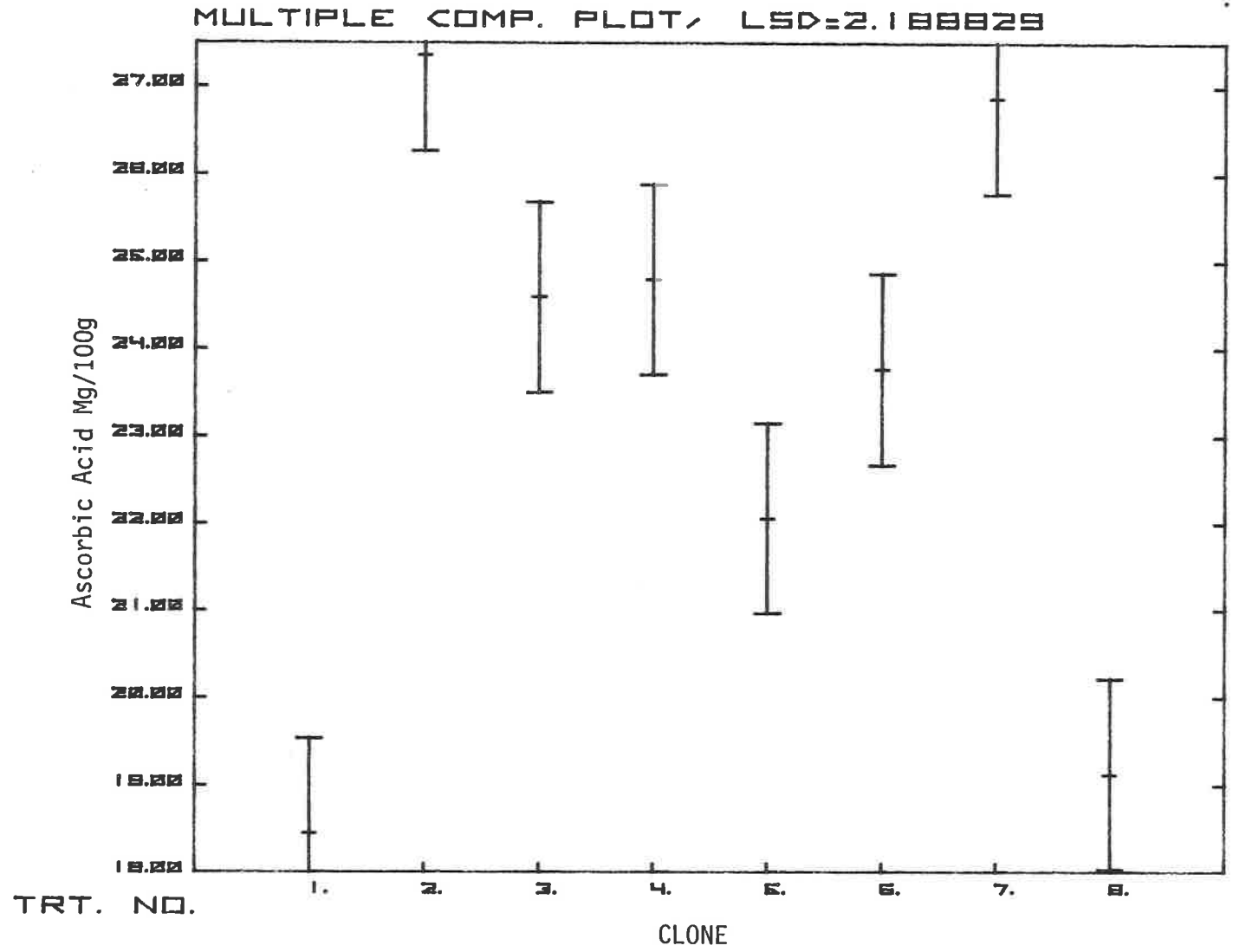

Figure 3. Ascorbic acid content measured in the fall, 1984 in 7 seedling clones and one cultivar.

Clone

1. CO 7913-1
2. CO 7920-3
3. CO 7922-1
4. AC 79100-1
5. AC 79128-1
6. AC 74133-1
7. BC 9668
8. R. Burbank

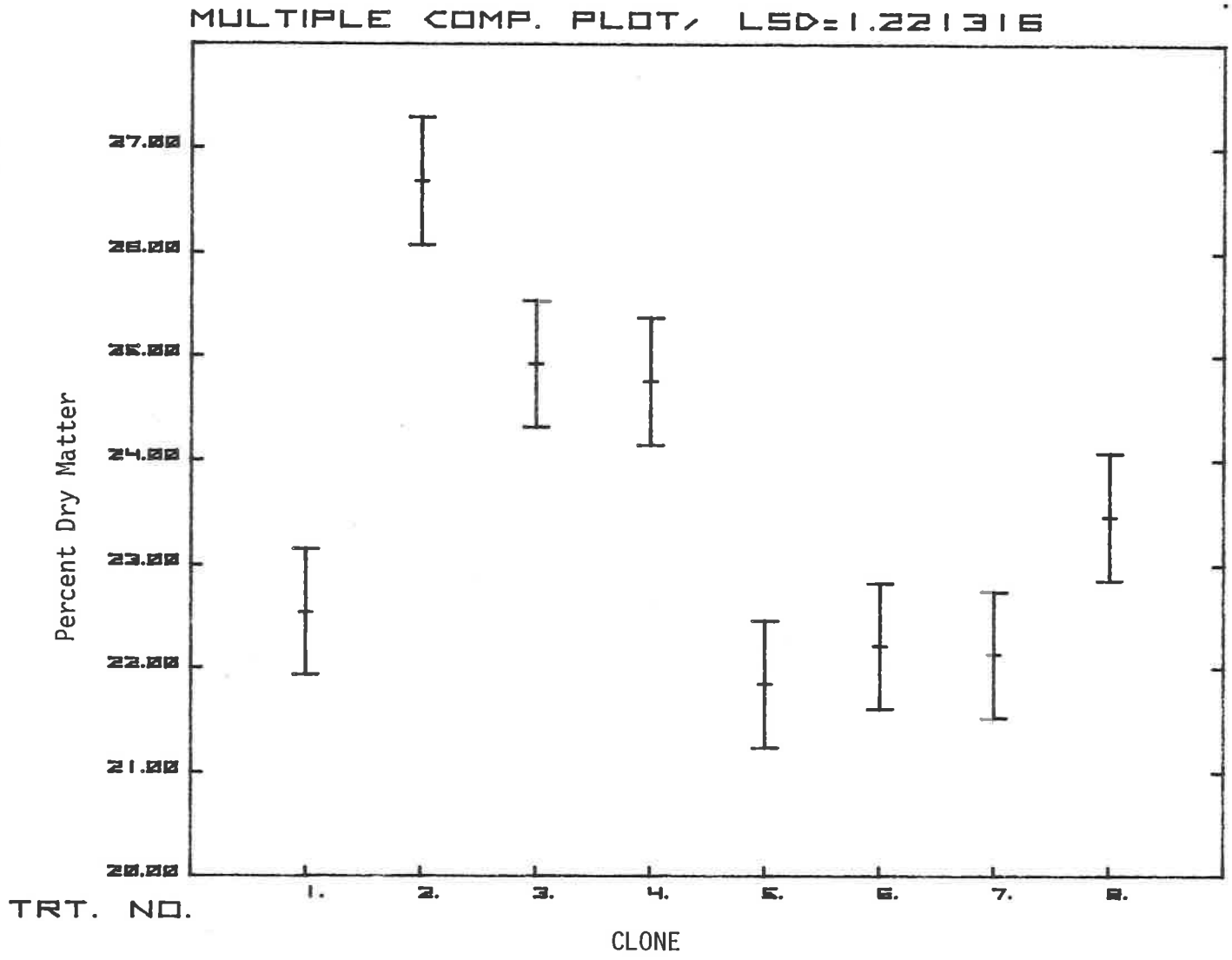

Figure 4. Percent dry matter measured in the fall, 1984, in 7 seedling clones and one cultivar.

	Clone
1.	CO 7913-1
2.	CO 7920-3
3.	CO 7922-1
4.	AC 79100-1
5.	AC 79128-1
6.	A 74133-1
7.	BC 9668-1
8.	Russet Burbank

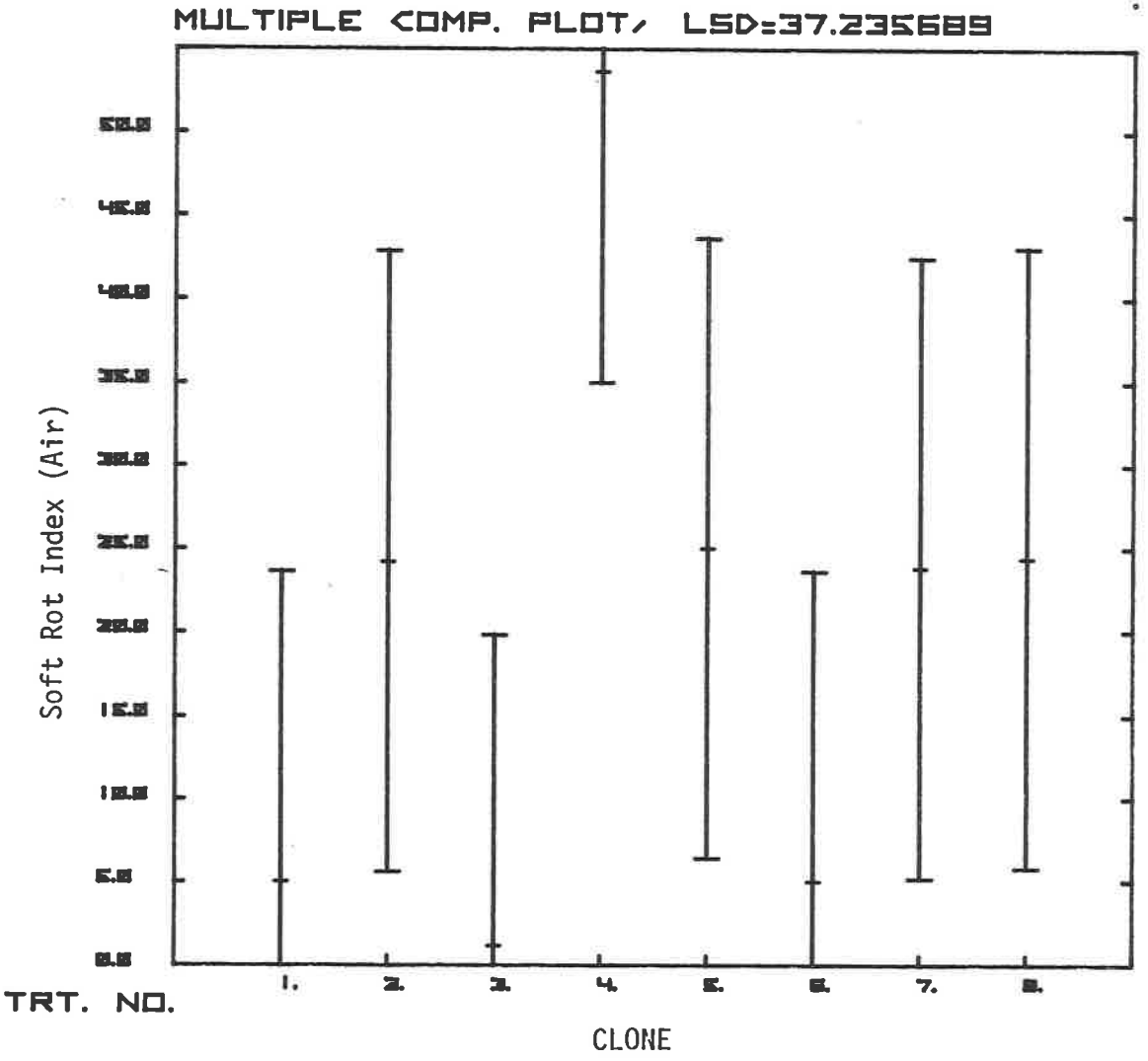

Figure 5. Soft rot susceptibility of 7 seedling clones and one cultivar observed in the fall, 1984 - Inoculated tissue slices incubated in air.

Clone

1. CO 7913-1
2. CO 7920-3
3. CO 7922-1
4. AC 79100-1
5. AC 79128-1
6. A 74133-1
7. BC 9668-1
8. Russet Burbank

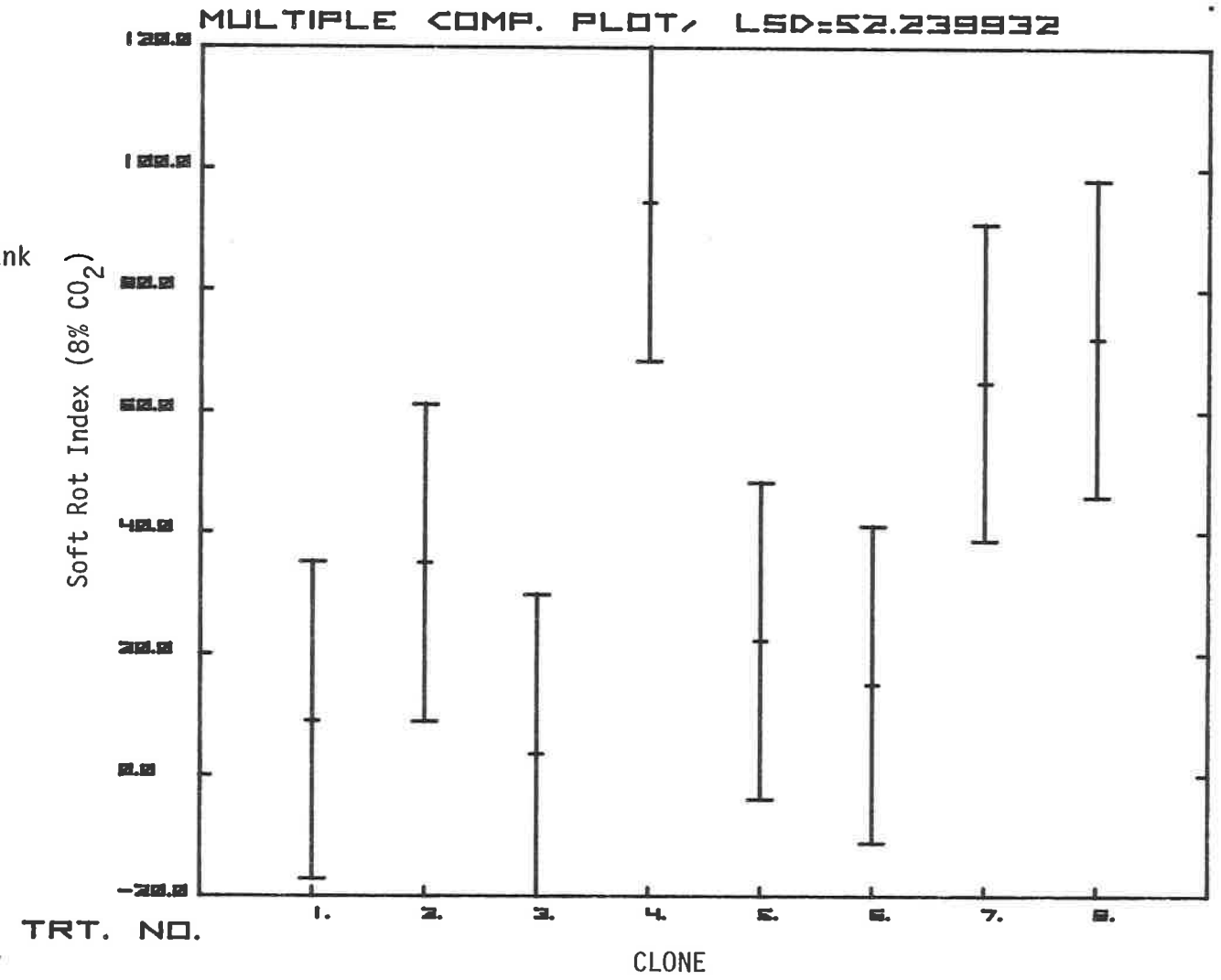

Figure 6. Soft rot susceptibility of 7 seedling clones and one cultivar observed in the fall, 1984 -- Inoculated tissue slices incubated in 8% CO_2.

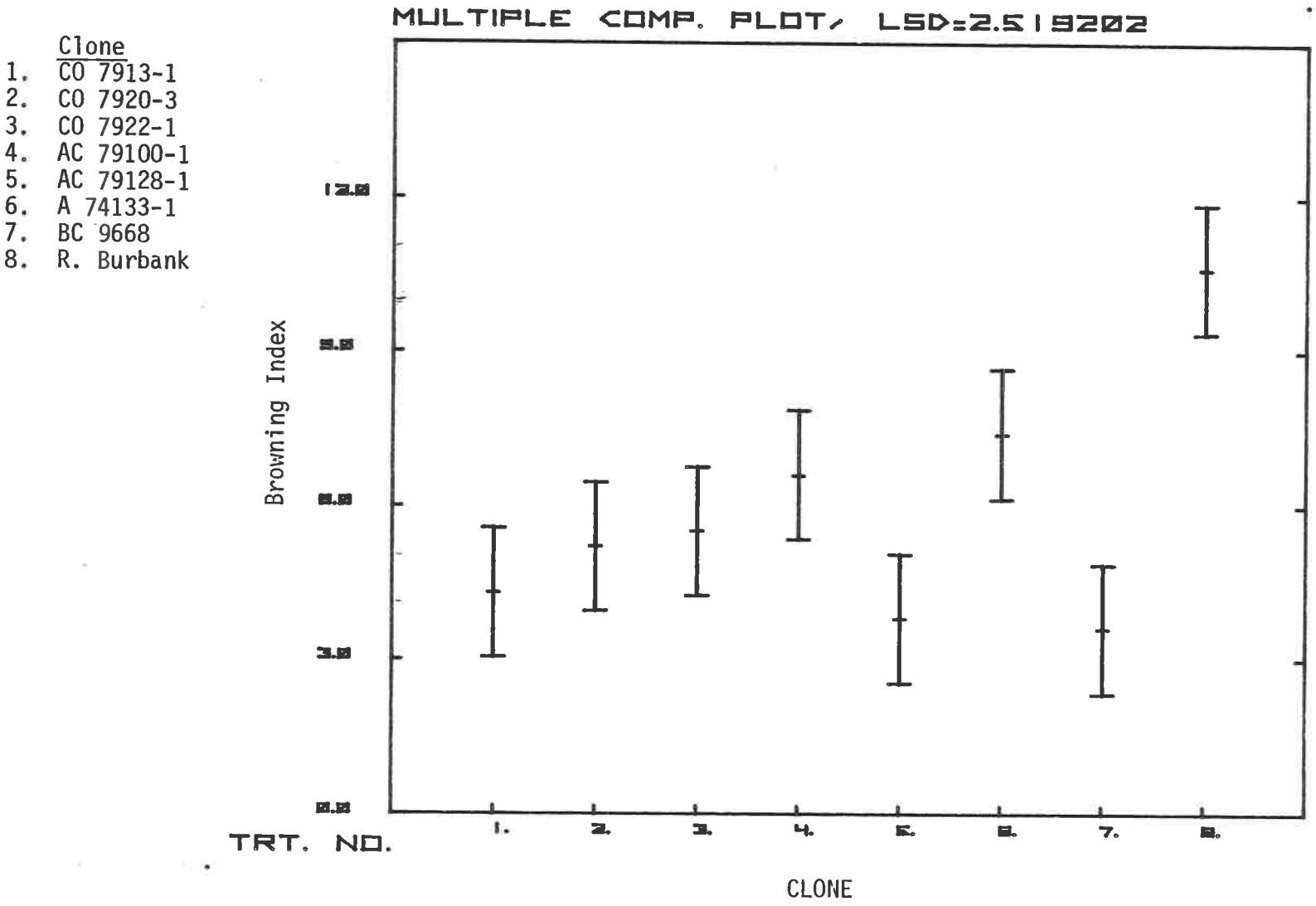

Figure 7. Enzymatic browning of pre-frozen 6mm thick transverse tuber slices of 7 seedling clones and one cultivar measured in the fall, 1984 (means of 5 slices from soft rot study).

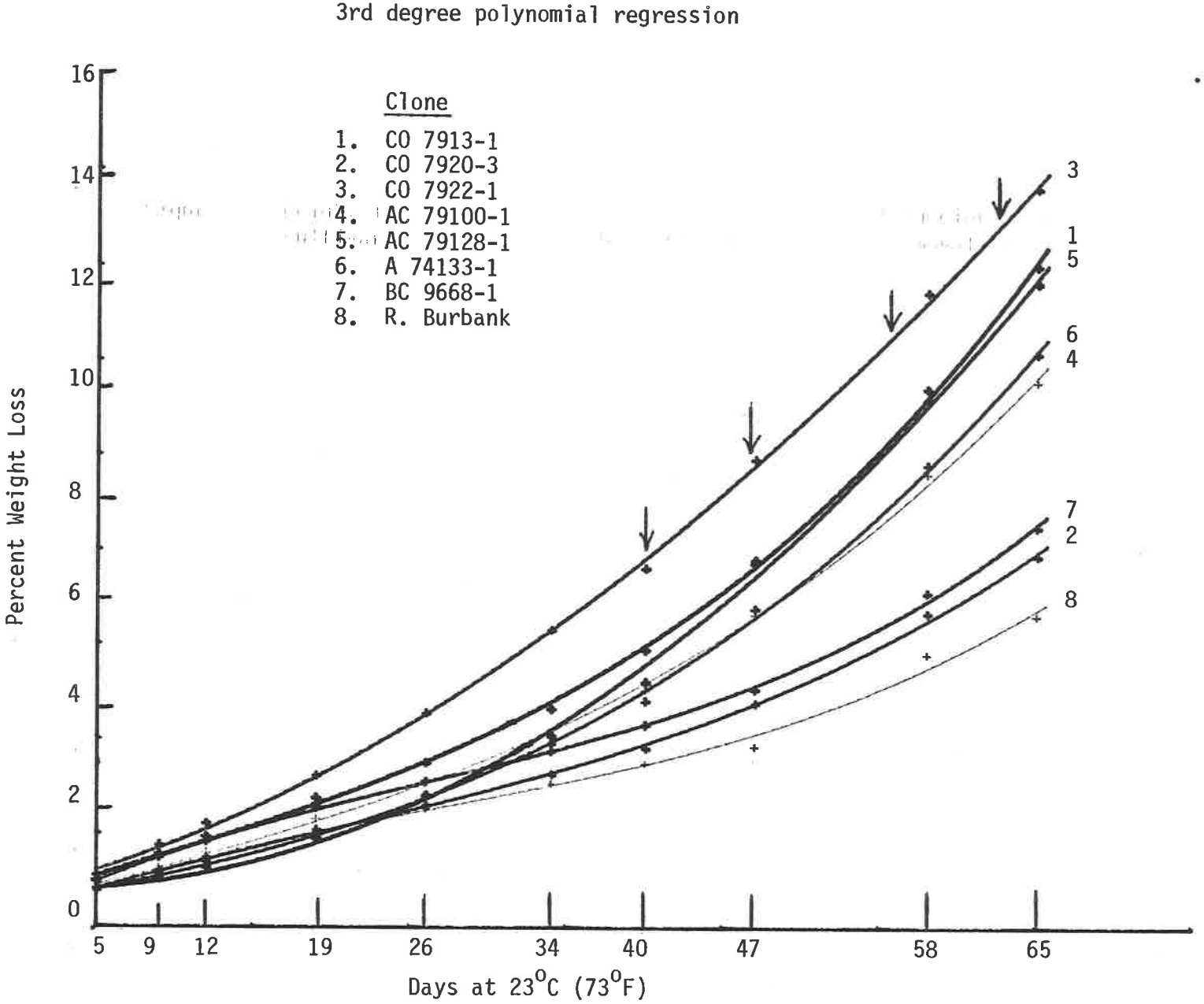

Figure 8. Weight loss progression at 23°C shown by 7 seedling clones and one cultivar as observed in the fall, 1984. Sprout removal indicated with arrows.

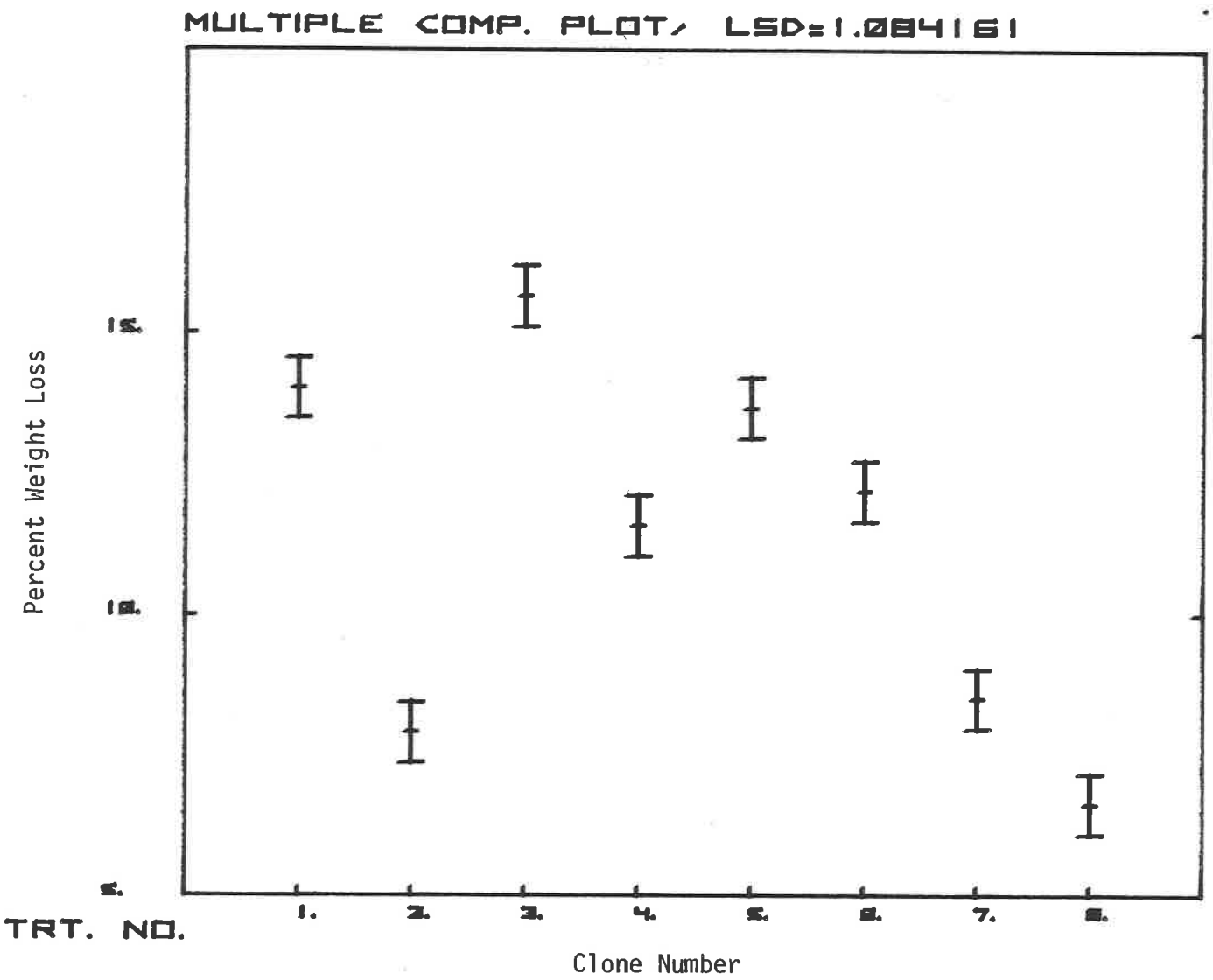

Figure 9. Weight loss comparisons after 65 days at 23°C of 7 seedling clones and one cultivar as observed in the fall, 1984.

Clone

1. CO 7913-1
2. CO 7920-3
3. CO 7922-1
4. AC 79100-1
5. AC 79128-1
6. A 74133-1
7. BC 9668-1
8. R. Burbank

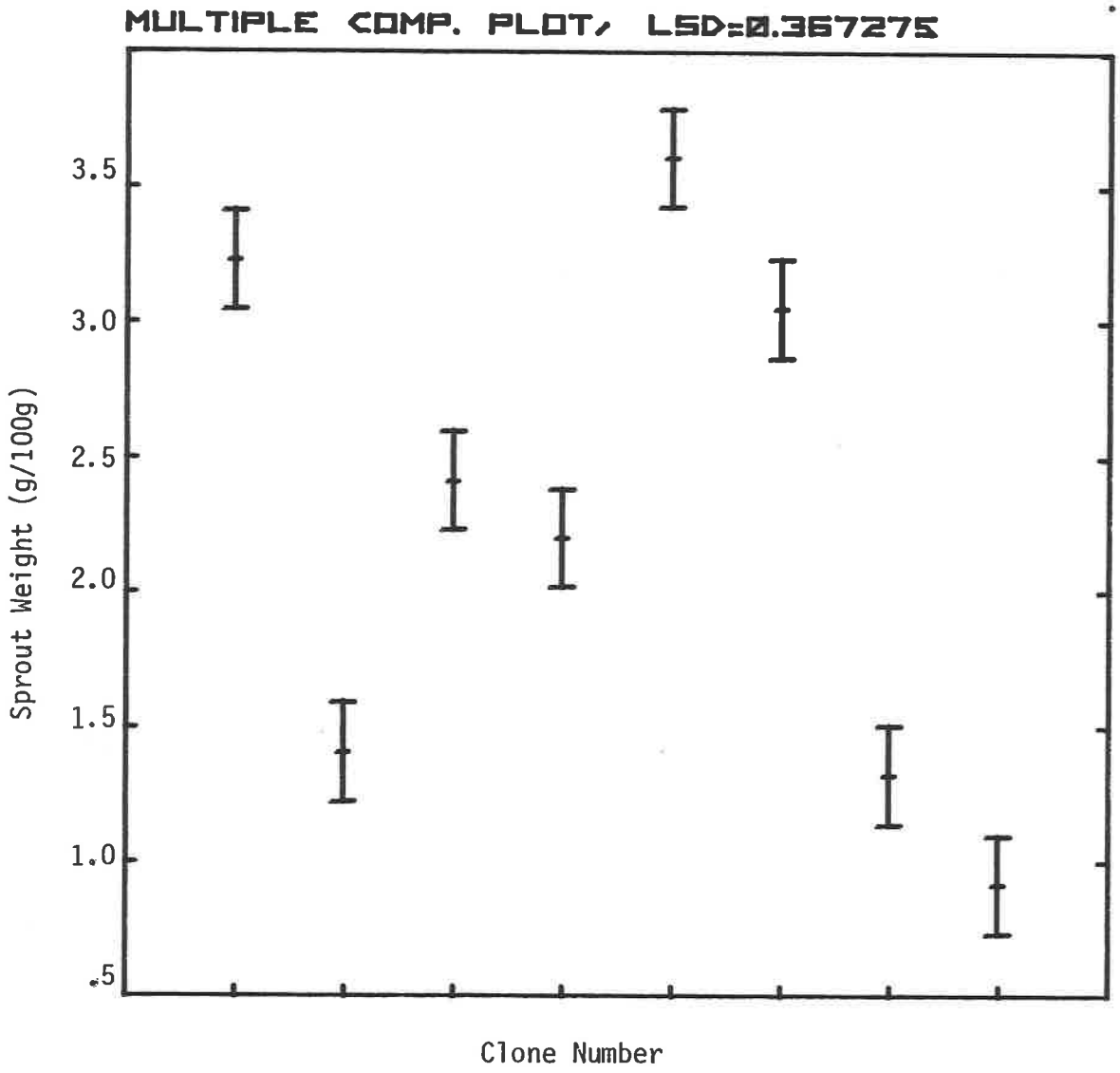

Figure 10. Weight of sprouts produced by tubers of 7 seedling clones and one cultivar during 61 days at 23°C (from 10/17/84 to 12/17/84).

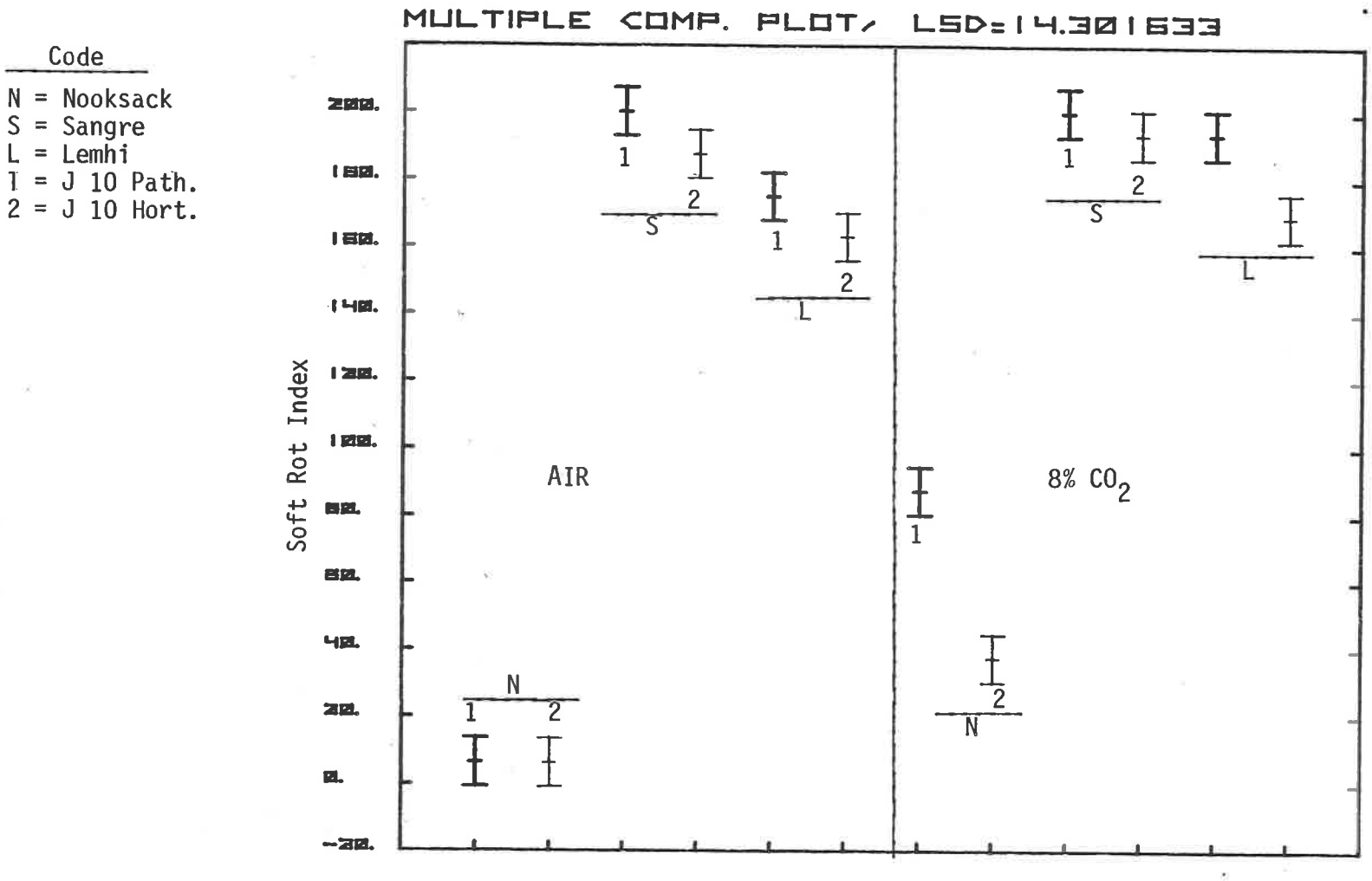

Figure 11. Comparison of two selections of Erwinia carotovara, var. Atroseptica in pathogenicity on 3 potato cultivars in the fall, 1984. (J-10 Hort = selection used several years; J-10 Path = more recent selection obtained from plant pathology.