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Table I.

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1941
FL-fol10835
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1941
 Maio 4-8, 1943

A Classification of the Seedlings from the 1941
Crosses, for their Resistance to South American Leaf Dis-
ease, Dothidella ulei; and Black Crust, Catacau-
ma Huberi.

An examination of the individual seedlings of the seedling families from the 1941 crosses was made on May 4-8, 1943 to determine their resistance to South American Leaf Disease (Dothidella ulei). The seedling families which were examined are planted in Block 116 on Belterra estate of the Ford rubber plantations. Planting rows are at a regular field spacing but the seedlings in the rows are spaced approximately 2½ feet apart. There are 74 seedling families now present in this area, as all of the seedlings of the combination B-32 x PB-86 have died.

Seedlings of a number of the families were planted in the garden area of Block 68 at a close nursery spacing of 1' x 1'. Due to the close planting of these seedlings and the somewhat isolated location of the seedlings, in respect to other rubber, a true picture of the resistance of these trees could not be obtained. Recently also, all of the seedlings in this plot which exhibited very poor resistance to SALD were removed. For the above reasons it has been deemed best not to include the ratings of these trees, since they would unduly influence the resistance ratings of their respective families planted in Block 116. By not including the ratings of the seedlings in Block 68 we lose the classification of the cross F-4542 x Tj-1 since it is not duplicated in Block 116.

The 74 seedling families of these 1941 crosses are represented by a total of 5192 seedlings. The largest progenies are: F-315 x Av.183(1004), F-1619 x Av.183(452), F-3430 x Tj-16(303), F-409 x Av.183(301), PB-86 x B-37(273), PB-86 x B-30(200). Of the families, 12 of them are represented by less than five seedlings. The classification of the families is contained in Table I below.

Table I.

Seedling Family	Classes of Resistance to Dothidella								N. of Trees	Sporulation			Catac. Huberi		
	2	3	4	5	6	7	8	9/10		Lgt.	Med.	Hvy.	Lgt.	Med.	Hvy.
Tj-1 x PB-86	-	-	-	-	6	12	54	108	180	10	21	68	26	7	-
Tj-1 x Av.256	-	-	-	-	2	2	15	7	26	-	2	8	4	-	-
B-86xTj-1	-	-	-	-	4	13	32	60	109	1	15	48	18	4	-
B-86xTj-16	-	-	-	2	4	25	34	41	106	2	8	71	22	7	3
B-86xPil.A44	-	-	-	-	8	16	24	34	82	5	7	43	21	1	-

Seedling Family	Classes of Resistance to Dothidella									N. of Trees	Sporulation Catac. Huberi				
	2	3	4	5	6	7	8	9/10	Lgt.		Med.	Hvy.	Lgt.	Med.	Hvy.
PB-86xAv.256	-	-	-	2	13	21	33	80	148	1	15	89	27	7	-
PB-86xPB-49	-	-	-	-	12	24	40	58	134	14	17	62	22	3	-
PB-86xB-30	-	-	-	21	93	30	27	29	200	8	30	145	58	55	16
PB-86xB-37	-	2	17	58	132	39	13	12	273	23	45	167	112	100	30
PB-86xB-39	-	-	-	3	7	8	1	-	19	-	4	15	6	5	3
PB-86xB-45	-	-	-	4	19	15	3	1	42	3	7	24	13	19	2
PB-86xB-67	-	-	-	2	8	21	2	2	35	3	8	23	12	19	3
PB-86xB-79	-	-	-	-	3	1	-	1	5	-	-	4	1	2	1
PB-86xB-106	-	-	1	1	2	-	-	-	4	-	1	2	1	1	-
PB-86xB-110	-	4	10	15	18	-	-	2	49	4	8	25	8	7	4
PB-86xF-176	-	-	4	6	17	5	2	-	34	-	9	24	18	13	3
PB-86xF-212	-	-	-	1	9	1	2	-	13	1	5	5	5	2	2
PB-86xF-374	-	-	-	1	35	35	17	3	91	-	6	76	32	11	1
PB-86xF-6523	-	-	1	7	13	1	-	1	23	3	3	15	12	6	-
Av256xTj-1	-	-	-	-	10	19	40	45	114	4	13	61	27	5	-
Av256xTj-16	-	-	-	-	2	11	9	23	45	-	7	21	10	1	-
Av256xPB-49	-	-	-	1	17	50	28	42	138	16	23	74	14	2	1
Av256xPB-86	-	-	-	1	20	56	29	52	158	15	16	77	46	9	-
Av256xPila44	-	-	-	-	2	-	-	-	2	-	2	-	-	2	-
Av256xB-32	-	-	-	3	10	4	3	-	20	2	3	9	5	3	-
Av256xF-176	-	-	1	4	7	3	3	4	22	1	2	16	4	4	-
Av256xF-6523	-	-	-	4	8	3	-	2	17	2	4	10	8	3	-
B-14xPB-86	-	-	-	-	4	5	1	1	11	1	1	8	1	-	-
B-30xPB-49	-	-	-	-	1	-	-	1	2	-	-	2	-	2	-
B-30xPB-86	-	-	-	1	13	4	-	-	18	-	4	11	4	9	1
B-30xPila44	-	-	-	1	9	3	-	-	13	1	2	8	4	4	3
B-37xTj-1	-	-	-	5	13	-	-	-	18	5	5	8	6	6	4
B-37xAv256	-	-	-	-	4	-	1	-	5	-	-	4	1	3	-
B-37xPB-49	-	-	-	1	3	1	1	1	7	1	-	4	3	1	-
B-37xF-374	-	-	-	2	1	-	-	-	3	1	1	-	2	-	-
B-39xTj-1	-	-	-	-	2	-	-	-	2	-	-	2	1	-	-
B-39xPB-49	-	-	2	5	22	6	3	-	38	3	5	30	19	3	3
B-39xPila44	-	-	-	-	3	2	-	-	5	-	-	5	2	1	-
B-45xTj-1	-	-	-	-	2	-	-	1	3	-	-	3	-	-	2
B-54xTj-1	-	-	-	1	6	2	-	-	9	1	2	6	2	6	-
B-54xPB-86	-	-	2	8	19	-	-	1	30	4	10	16	13	11	6
B-54xPila44	-	-	1	5	7	1	-	2	16	4	1	10	5	5	2
B-54xAv256	-	-	-	1	1	-	-	1	3	2	-	1	1	2	-
B-55xPB-49	-	-	-	2	21	8	-	4	35	-	4	30	17	9	-
B-55xPB-86	-	-	-	-	1	-	-	1	2	-	1	1	1	1	-
B-55xPila44	-	-	1	3	9	5	4	6	28	2	4	18	10	7	1
B-55xAv256	-	-	-	-	1	2	-	-	3	1	-	2	2	-	1
B-59xTj-1	-	-	-	-	1	-	-	-	1	-	-	1	-	-	-
B-67xTj-1	-	-	-	-	1	-	-	-	1	-	-	1	1	-	-
B-67xTj-16	-	-	-	5	13	1	-	2	21	4	5	10	4	10	4
B-67xAv256	-	-	-	2	8	-	-	-	10	-	1	8	3	7	-
B-67xF-374	-	-	-	2	7	1	-	-	10	2	3	3	5	2	-
B-79xPila44	-	-	1	5	6	2	-	-	14	3	2	7	3	9	2
B-79xPB-86	-	-	1	10	23	3	2	1	40	5	12	16	10	19	6
B-87xTj-1	-	-	-	2	1	1	1	1	6	2	3	1	1	3	-

Handwritten notes and calculations:

- 2261 (with arrow pointing to Class 5 in the table)
- 3, 11, 64, 107, 188, 185, 45 (vertical list of numbers)
- 452 + 100 = 552
- 18 x 2 = 36
- 1800 / 452 = 4.00 (approx)
- 42 (with a checkmark)

Seedling Family	Classes of Resistance to Dothidella									No. of Trees	Sporulation			Catac. Huberi		
	2	3	4	5	6	7	8	9/10	Lgt.		Med.	Hvy.	Lgt.	Med.	Hvy.	
B-3312xAvl83	-	-	4	22	52	8	1	-	87	9	19	42	28	34	8	
F-176xPB-86	-	-	-	-	3	-	-	-	3	-	-	3	1	2	-	
F-176xAv.183	-	-	11	54	67	16	4	3	155	14	23	60	34	18	6	
F-211xAvl83	-	-	1	3	14	1	-	-	19	4	6	6	7	8	-	
F-315xAvl83	7	75	284	233	274	74	32	25	1004	88	113	252	109	194	78	
F-366xAvl83	-	-	-	1	36	44	11	10	102	4	16	66	26	9	-	
F-374xTj-16	-	-	-	-	4	1	-	-	5	-	-	5	1	2	-	
F-374xAvl83	-	-	-	4	16	4	2	6	32	2	5	19	8	4	1	
F-409xAvl83	-	19	75	95	84	22	3	3	301	40	61	115	92	75	43	
F-1023xAvl83	-	-	-	2	13	18	4	-	37	3	4	28	17	7	-	
F-1619xAvl83	3	11	64	107	188	45	13	21	452	26	54	163	110	124	43	
F-3160xTj-1	-	-	-	-	11	9	5	4	29	1	3	13	5	2	1	
F-3263xAvl83	-	-	2	9	16	13	18	6	64	3	8	38	30	12	4	
F-3395xTj-1	-	-	-	1	3	6	1	1	12	3	2	6	3	-	-	
F-3430xTj-16	-	-	-	2	30	98	77	96	303	23	33	153	79	23	2	
F-4537xTj-1	-	3	6	11	4	-	-	-	24	3	7	9	3	-	1	
F-4537xAvl83	1	4	26	42	27	1	-	1	102	22	23	29	6	1	-	
F-4542xF2113	1	2	2	3	-	-	-	1	9	3	1	-	-	-	-	
F-6520xTj-1	-	-	-	-	5	3	-	-	8	-	1	6	2	1	-	

Totals 12 120 517 786 1530 825 595 807 5192 408 762 2411 1212 934 293

Table I above, classifies the individual seedlings for their resistance to SALD, for sporulation by this disease, and for the incidence of Catacauma Huberi. There are 12 seedlings or .23 % in Class 2 on the Langford scale of resistance to SALD, 120 trees or 2.31 % in Class 3, 517 seedlings or 9.95 % in Class 4, and 786 seedlings or 15.14 % in Class 5. Altogether there are 1435 seedlings or 27.63 % of the total number which rate Class 5 or better in their resistance to South American Leaf Disease.

Sporulation by SALD is quite heavy among the seedlings. A total of 3545 seedlings or 68.27 % exhibit sporulation to some extent. In 7.85 % of the cases sporulation is sparse, in 14.67 % of them sporulation is moderate, and in 45.75 % heavy sporulation is found.

Black Crust (Catacauma Huberi) is not so severe among the seedlings of these families as among those of the 1938-1940 crosses. Apparently the seedlings are not attacked heavily by this disease before they are several months of age. In the case of young nursery seedlings Catacauma is usually very light. A total of 2439 seedlings or 46.97 % have been attacked to some extent by Black Crust. Light infections appear in 23.24 % of them, 17.96% suffer moderate attacks, and only 5.67 % of the seedlings have been heavily diseased by this fungus.

A study of Table I will illustrate the universally poor resistance of the seedlings of crosses between Eastern clones. These crosses are 12 in number and they are represented by 1243 seedlings. Only 5 seedlings or .40 % of them fall in Class 5. Most of the seedlings from these combinations fall into Classes 7-10 for resistance.

Table II

Seedling Family	Resistance				Class 5	Total percentage Classes 1-5
	1	2	3	4		
F-4542 x F2113	-	11.1%	22.2%	22.2%	33.3%	88.8%
F-4537 x Tj-1	-	-	12.5	25.0	45.8	83.3
F-4537 x Av183	-	1.0	3.9	25.5	41.2	71.6
F-409 x Av183	-	-	6.4	24.9	31.5	62.8
F-315 x Av183	-	.7	7.5	28.3	23.1	59.6
PB-86 x B-110	-	-	8.2	20.4	30.6	59.2
PB-86 x B-106	-	-	-	25.0	25.0	50.0
F-176 x Av183	-	-	-	7.1	34.8	41.9
F-1619 x Av183	-	.7	2.4	14.1	23.7	40.9
B-54 x Pil.A44	-	-	-	6.3	31.2	37.5
PB-86 x F-6523	-	-	-	4.4	30.4	34.8
B-54 x PB-86	-	-	-	6.7	26.6	33.3
B-3312 x Av183	-	-	-	4.6	25.2	29.8
PB-86 x F-176	-	-	-	11.7	17.7	29.4
PB-86 x B-37	-	-	.8	6.2	21.2	28.2

23.7
14.1
2.4
.7

40.9

In Table II there are listed the 15 seedling families which have the highest percentages of seedlings resistant to SALD (Classes 1-5). The table gives the total percentages of the seedlings of each of these families falling into the first 5 classes, and also a breakdown of the percentages by classes. Among these families the Benthamiana crosses of F-4542 x F-2113, F-4537 x Tj-1, F-4537 x Av.183 are most outstanding in their resistance, occupying the first three positions in the table. Other outstanding combinations are: F-409 x Av.183, F-315 x Av.183, PB-86 x B-110. The seedling families having the highest percentage of their seedlings in classes 2-4 are: F-4542 x F-2113, F-4537 x Tj-1, F-315 x Av.183, F-409 x Av.183, F-4537 x Av.183, and PB-86 x B-110. The cross of F-4542 x F-2113 has one-third of its seedlings in Classes 2-3.

Table III.

Seedling Family	Sporulation by SALD.			Percentage Total Trees Sporulating.
	Light	Medium	Heavy	
F-4542 x F2113	33.3%	11.1%	--	44.4%
F-4537 x Tj-1	12.5	29.1	37.5%	79.1
F-4537 x Av183	21.5	22.5	28.5	72.5
F-409 x Av183	13.3	20.2	37.6	71.1
F-315 x Av183	8.8	11.2	25.1	45.1
PB-86 x B-110	8.2	16.4	50.9	75.5
PB-86 x B-106	---	25.0	50.0	75.0
F-176 x Av183	9.0	14.8	38.7	62.5
F-1619 x Av183	5.7	11.9	36.1	53.7
B-54 x Pil.A44	25.0	6.2	62.5	93.7
PB-86 x F-6523	13.0	13.0	65.3	91.3
B-54 x PB-86	13.3	33.3	53.4	100.0
B-3312 x Av183	10.3	21.8	48.3	80.4
PB-86 x F-176	---	26.4	70.7	97.1
PB-86 x B-37	8.4	16.5	61.2	86.1

36.1
11.9
5.7

53.7

In the preceding Table III the same 15 seedling families with the highest percentages of seedlings resistant to SALD, are presented to demonstrate the comparative amounts of sporulation. The families with the lowest percentages of sporulation by SALD are: F-4542 x F-2113, F-315 x Av.183, F-1619 x Av.183, F-176 x Av.183. There is a wide range between families in the percentage of seedlings which sporulate. However, sporulation is heavy in most of the families. The seedlings of the cross of F-4542 x F-2113 have the lowest percentage of sporulation (44.4%). All of the seedlings of the family B-54 x PB-86 have sporulated. 29-61

Some of the crosses between Eastern clones do not exhibit especially heavy sporulation. This is not because the seedlings do not sporulate, but rather is due to the fact that many of these trees suffer heavy to complete defoliation which leaves little opportunity for proper classification for sporulation.

There are a few other families which show fairly low rates of sporulation. They are: F-3160 x Tj-1 (58.6%), F-176 x Av.183 (62.5%), F-3430 x Tj-16 (69.0%), Av.256 x B-32 (70.0%).

Table IV.

Seedling Family	Catacauma Huberi			Percentage Total Trees Infected
	Light	Medium	Heavy	
F-4542 x F2113	---	---	---	---
F-4537 x Tj-1	12.5%	---	4.1%	16.6%
F-4537 x Av183	5.8	1.0%	---	6.8
F-409 x Av183	30.5	24.9	14.3	69.7
F-315 x Av183	10.8	19.3	7.8	37.9
PB-86 x B-110	16.2	14.4	8.1	38.7
PB-86 x B-106	25.0	25.0	---	50.0
F-176 x Av183	22.0	11.6	3.9	37.4
<u>F-1619 x Av183</u>	24.3	27.4	9.6	<u>61.3</u>
B-54 x P11.A44	31.2	31.2	12.6	75.0
PB-86 x F-6523	52.0	26.0	---	78.0
B-54 x PB-86	43.4	36.6	20.0	100.0
B-3312 x Av183	32.2	39.1	9.1	80.4
PB-86 x F-176	52.8	8.4	38.8	100.0
PB-86 x B-37	41.0	36.6	11.0	88.6

From Table IV it will be noted that of the 8 families having the highest percentages of seedlings resistant to SALD, 7 of them also have the lowest percentages of infection by Black Crust. The highest resistance to the attacks of this fungus is exhibited by F-4542 x F-2113, whose seedlings are free from this disease. The crosses of F-4537 x Av.183, F-4537 x Tj-1, F-176 x Av.183, F-315 x Av.183 are also very resistant to the attacks of this fungus.

The seedlings of two combinations; B-54 x PB-86 and PB-86 x F-176, have 100.0% of their seedlings infected by Black Crust.

There are a number of other families which have shown good resistance to the attacks of Catacauma. They are: B-14 x PB-86 (9.1 %), F-3395 x Tj-1 (25.0 %), F-3160 x Tj-1 (27.5 %), F-3430 x Tj-16 (34.3 %), F-366 x Av.183 (34.3 %), Av.256 x B-32 (40.0 %), F-374 x Av.183 (40.6%).

Most of the crosses between Eastern clones show low percentages of infection by Catacauma, and where the fungus appears the infections are mostly light. Due to the heavy defoliation of the seedlings of such crosses it is impossible to reliably evaluate the resistance of these seedling families to the fungus. Even if they are quite resistant to Black Crust, the families are of little interest because of their high susceptibility to South American Leaf Disease.

Table V.

Seedling Family	Seedlings in Classes 1-5 for Resistance to SALD	Seedlings Sporulating with SALD	Seedlings Attacked by Catacauma Huberi
F-4542 x F2113	88.8%	44.4%	---
F-4537 x Tj-1	83.3	79.1	16.6%
F-4537 x Av183	71.6	72.5	6.8
F-409 x Av183	62.8	71.1	69.7
F-315 x Av183	59.6	45.1	37.9
PB-86 x B-110	59.2	75.5	38.7
PB-86 x B-106	50.0	75.0	50.0
F-176 x Av183	41.9	62.5	37.4
<u>F-1619 x Av183</u>	<u>40.9</u>	<u>53.7</u>	<u>61.3</u>
B-54 x Pil.A44	37.5	93.7	75.0
PB-86 x F-6523	34.8	91.3	78.0
B-54 x PB-86	33.3	100.0	100.0
B-3312 x Av183	29.8	80.4	80.4
PB-86 x F-176	29.4	97.1	100.0
PB-86 x B-37	28.2	86.1	88.6

Table V is a summary of the 15 best seedling families of the 1941 crosses. A number of the families have shown up well in all respects. At the present time the best families are: F-4542 x F-2113, F-315 x Av.183, and F-176 x Av.183.

The Benthamiana crosses are again among the best families although the crosses of F-4537 x Tj-1 and F-4537 x Av.183 exhibit heavy sporulation. Ordinarily heavy sporulation on the leaves of trees of these crosses does not cause them to defoliate.

Defolia depisnocampa

All of the Benthamiana combinations show very high resistance to the attacks of Black Crust.

The crosses of F-315 x Av.183 and F-176 x Av.183 have good percentages of their seedlings in classes 1-5 for resistance to SALD, sporulation by the disease is moderate and Catacauma is light.

The last six families on the list are those which have the lowest percentages of seedlings falling into Classes 1-5 for resistance to SALD. These families are also the poorest; having very high percentages of their seedlings sporulating, and being heavily attacked by Catacauma Huberi.

Only nine of the 74 families representing the 1941 crosses are outstanding in some respect.

May 16, 43

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