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Plot at Belterra, is a 40 acre block which has been divided into ten equal ten acre plots. Plot A contains the seeds of the 1938 crosses. Most of plot B is planted with the same seeds of various Eastern clones. Plots C and D are an exception of some rows on each end of these plots with the seedling families from the 1939 crosses. In all of the plots a planting distance of 10 x 10 m is used.

It is:

The latex flows from cut to cut along the stem.

The latex flows sufficiently for



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The Resistance to South American Leaf Disease of Seed-
ling Families from the 1938 Program of Cross Pollinations on
The Fordlandia Estate of the Ford Plantations.

In the series of crosses made during the 1938 flowering season, 22 seedling families are represented. These crosses were made at Fordlandia and the seeds brought to Belterra for planting, early in 1939. In all of the crosses Ford clones were the female parents, and these were crossed with but two Eastern clones: PB-186 and false Av.49. The reason for using only two Oriental clones being that at that time they were the only Eastern material large enough to flower. The 1939 crossing program was also restricted for the same reason.

It is most unfortunate that the Eastern clone which was supposed to be Av.49, is not. Av.49 is a high-yielding clone with desirable characteristics. It would have had great possibilities in crossing programs with local resistant material. As it is we do not know the identity of the false "Av.49" or what characters for yield it may possess.

Block 91 at Belterra, is a 40 acre block which has been divided into four equal ten acre plots. Plot A contains the seedling families of the 1938 crosses. Most of plot B is planted with illegitimate seeds of various Eastern clones. Plots C and D, with the exception of some rows on each end of these plots, are planted with the seedling families from the 1939 crosses made at Fordlandia. In all of the plots a planting distance of 15 x 15 feet is used.

In August 1940, all of the seedlings of the 1938 crosses which were of sufficient size were given the Cramer test. The results of this test are given with the description of each seedling family. The families giving the best results from this test are: F-1166 x Av.49, F-5566 x PB-186, F-1276 x Av.49, F-292 x Av.49, F-1395 x PB-186 and F-269 x Av.49. The classification of latex flow on the Cramer test is:

- Class I The latex flows from cut to cut and further down along the stem.
- Class II The latex flows sufficiently for some or all of the cuts to be connected, but does not run down the stem.
- Class III The latex runs a little further down than the lower point of the V, so that four white Y's are seen or there is at least a thick drop of latex at the end of the cut.
- Class IV The cuts show as thick white lines.
- Class V The cuts show as narrow white lines or almost not.

Only five of the twenty-two combinations in the 1938 crosses were with PB-186, while 17 families are crosses with false Av.49. The combinations which exhibit the most resistance to South American Leaf Disease are: F-328 x Av.49, F-316 x Av.49, F-707 x Av.49, and F-170 x Av.49. All of these have a rating of 5 or better on the Langford scale and each has false Av.49 as a male parent. Three crosses with PB-186 are in the 5-6 range and show considerable resistance.

The following pages of this report contain descriptions of the individual seedling families from the 1938 program of cross-pollinations.

F-328 x Av.49

This seedling family is represented by 90 trees. The general appearance of the family is good. Growth is usually vigorous and some of the trees are large enough to test-tap in the spring. The family exhibits a strong branching system with one central trunk and small laterals. Foliage is a heavy, large leafed type, and apparently there is very little defoliation by South American Leaf Disease. Several seedlings are rather small.

This family appears to have a great deal of resistance to SALD. Many seedlings are free from any sign of the disease or only show small reddish-brown spotting of the leaves which causes very little damage. In some cases there is spotting which causes small necrotic lesions and some deformation. There is no evidence of any sporulation.

There is heavy spotting on the leaves of many trees by *Catacauma Huberi* "Black Crust". This disease causes heavy black circular encrustations on the lower surface of the leaves. This causes a yellowish green spotting on the upper leaf surface but does little other damage.

The Cramer test of the Family was: 3 trees a No.3, 34 a No. 4, and 27 a No.5.

Langford scale 3-4

F-316 x Av.49

This family is composed of 85 trees. Growth is vigorous and the family has a fine appearance. This is one of the most resistant families. Some trees are about ready for test-tapping. Many trees are nearly free from disease and have only small reddish spots with minor deformation and necrotic damage. At most, there is spotting of the leaves with some necrotic lesions causing slight damage and deformation. There is no sign of sporulation and practically no defoliation. Some of the seedlings were in flower at the time of examination - Nov. 12-14, 1942.

There is some spotting of the leaves by Black Crust but no serious damage is done.

The family has a wide range on the Cramer scale. 2 trees rate a No. 1, 5 trees a No. 2, 14 trees a No. 3, 6 trees a No. 4, and 36 trees a No. 5.

Langford scale 3-4

F-707 x Av.49

This family is represented by 74 seedlings. Many of the seedlings have a good growth but there is a few that are small and suffer some die-back. This family appears to have considerable resistance to South American Leaf Disease. Many seedlings exhibit practically no sign of damage. At most, there is spotting with slight necrosis and damage, with some minor deformation. No sporulation was seen.

There is spotting by Catacauma which is often heavy. In some instances moderate defoliation results.

The Cramer ratings were as follows: 3 trees a No.2, 4 trees a No. 3, 18 trees a No. 4, and 45 trees a No. 5.

Langford scale 4-5

F-170 x Av-49

This is a large family composed of 149 seedlings. The trees have a compact, moderate growth. Some of the seedlings are nearly large enough for test-tapping. There is a considerable range in the amount of infection by South American Leaf Disease. Many trees are fairly free from disease but others have spotting with necrotic lesions causing distinct damage and deformation. Sporulation ranges from light to medium. Defoliation is very moderate.

Catacauma has caused heavy spotting but little damage. As a whole this family has a healthy appearance and apparently has considerable resistance.

The Cramer test rated this family as: 2 trees a No.1, 2 trees a No. 2, 37 trees a No. 3, 49 trees a No. 4, and 41 trees a No. 5.

Langford scale 5

F-406 x PB-186

There are ten seedlings of this cross. The trees have a tall slender growth. South American Leaf Disease causes spotting of the leaves with necrotic lesions and deformation. There is some evidence of sporulation. Defoliation is moderate. One seedling has rather severe spotting by Catacauma, which causes reddening and premature loss of leaves. When leaves are turned red by "Black Crust" the upper leaf surface is spotted with bright yellowish-green spots opposite the spots of disease on the under leaf surface.

On the Cramer test the family rates: 1 tree a No.2, 1 tree a No.3, 5 trees a No.4, 2 trees a No.5.

Langford scale 5-6

F-226 x PB-186

This family has but 7 seedlings. Three trees have a vigorous growth and are nearly large enough to test-tap. The remaining four seedlings have grown poorly. South American Leaf Disease causes extensive small reddish spotting of the leaves with very great deformation and some necrotic lesions. There is no evidence of sporulation and only minor defoliation occurs.

There is some light spotting by Catacauma.

Cramer test ratings for the family are: 3 trees a No.3, 4 trees a No.4, 1 a No.5.

Langford scale 5-6

F-681 x PB-186

This family contains 17 seedlings. Except for 3 trees this family is lacking in vigor. SALD causes spotting and necrotic damage. There is light sporulation and some deformation. Defoliation is moderate. Heavy spotting is caused by Catacauma Huberi.

The Cramer ratings are: 8 trees a No.2, 2 a No.3, 3 a No.4, and 2 a No.5.

Langford scale 5-6

F-1071 x Av-49

This family consists of 9 seedlings. Five of these trees are large, while the remaining four are considerably smaller. Two of the seedlings, including one of the larger ones, show heavy defoliation and some die-back. On the remaining trees the foliage is quite heavy. One seedling has numerous small fruits. South American Leaf Disease causes spotting and some necrosis with deformation. There is no evidence of sporulation.

Catacauma causes heavy spotting and some damage.

Ratings on the Cramer test were: 2 trees a No.2, and 7 trees a No.5.

Langford scale 5-6

F-208 x Av.49

This family is composed of 54 trees of moderate vigor. There are no trees large enough for test-tapping. SALD causes spotting and necrotic lesions with some deformation. In some cases there is extensive damage and raggedness. Many trees show moderate to heavy sporulation. Defoliation is moderate.

Some of the seedlings are spotted by Catacauma, but no serious damage results.

The Cramer ratings are: 2 trees a No.2, 1 a No.3, 17 a No.4, and 30 a No.5.

Langford scale 6

F-705 x Av.49

There are 10 seedlings in this family. The trees have a tall, slender, irregular growth. One seedling has died-back. SALD causes spotting with necrotic lesions accompanied by considerable deformation in many cases. There is moderate defoliation. No signs of sporulation were noted.

Catacauma Huberi has caused minor spotting in some instances.

The Cramer test gave the following results: 1 tree a No.2, 1 a No.3, 2 a No.4, and 5 trees a No.5.

Langford scale 6

F-706 x Av.49

A family of 37 seedlings of moderate growth. A few of the seedlings are rather heavily defoliated. South American Leaf Disease causes spotting and some deformation of the leaves, with necrotic lesions. A few seedlings exhibit moderate to heavy sporulation.

There is heavy spotting of the leaves by Catacauma but very slight damage.

Cramer ratings are: 1 tree a No.1, 3 a No.2, 6 a No.3, 4 a No.4, and 17 trees a No.5.

Langford scale 6

F-229 x Av.49

This seedling family consists of 17 trees. These seedlings show variation in growth, ranging from small seedlings which have died-back, to trees of moderate vigor. SALD causes only minor damage to the leaves. There is spotting and deformation of the leaves but only a few lesions. There is no sign of sporulation.

Considerable spotting is caused by Catacauma.

The Cramer ratings of these seedlings were: 1 tree a No.3, 2 a No.4, and 10 a No.5.

Langford scale 6?

F-570 x Av-49

This is a family of 60 seedlings. Most of these trees have a

fairly vigorous growth and a few should be large enough for test-tapping in early 1943. The most vigorous seedlings are nearly free from any sign of SALD, except for reddish spots causing slight deformation. In other seedlings disease causes spotting and necrotic lesions with damage. Two trees show sporulation, one fairly heavy. Only moderate defoliation. Several trees have suffered die-back and rather heavy defoliation.

There is scattered spotting by Catacauma, except for one seedling which has been heavily hit causing damage and defoliation.

The Cramer test gave the following results: 4 trees a No.2, 6 a No.3, 19 a No.4, and 21 trees a No.5.

Langford scale 6-7

F-292 x Av.49

There are 52 seedlings in this family. Most of the trees have a moderately vigorous rate of growth. South American Leaf Disease causes heavy spotting of the leaves with necrotic lesions causing distinct damage and deformation with some raggedness. There is medium sporulation. Defoliation is moderate.

Catacauma, in some cases, has caused severe spotting and reddening of the leaves with defoliation.

This family has a good Cramer rating: 6 trees a No.1, 7 a No.2, 11 a No.3, 14 a No.4, and 6 trees a No.5.

Langford scale 6-7

F-315 x Av.49

This family has 52 seedlings. Although a few trees have a vigorous rate of growth, this family has a generally poor growth. Some of the seedlings exhibit signs of die-back and others moderate defoliation. SALD causes some spotting and necrotic lesions with damage and deformation of the leaves. There was moderate sporulation in several instances. A number of the seedlings have been heavily spotted by Catacauma, which has caused discoloration.

Cramer ratings are: 2 trees a No.2, 14 a No.4, and 29 trees a No.5.

Langford scale 6-7

F-5566 x PB-186

The 47 seedlings of this family present a variable growth. Several trees are large enough to test-tap soon. Eight seedlings have had the terminal shoot die-back. SALD causes extensive spotting with numerous small necrotic lesions and often severe deformation. Possibly light sporulation. Moderate

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defoliation. No spotting by *Catacauma Huberi* was noted.

This family gave good results in the Cramer test. The ratings were: 12 trees a No.2, 20 trees a No.3, 6 trees a No.4, and 3 trees a No.5.

Langford scale 6-7

F-1395 x PB-186

There are 38 seedlings in this family. Quite a few of the trees have a vigorous rate of growth. Some of the seedlings show fairly heavy defoliation and a little die-back. South American Leaf Disease is rather severe. There is heavy spotting of the leaves with necrotic damage and some deformation. In some instances heavy sporulation was noted. There is only minor spotting by *Catacauma*.

The Cramer ratings are: 8 trees a No.1, 9 trees a No.2, 7 trees a No.3, 1 tree a No.4, and 5 trees a No.5.

Langford scale 7

F-351 x Av.49 *Fx25*

This seedling family has 30 trees. Growth has been rather poor. Some of the trees exhibit die-back. A number of new flushes of leaves have been hit by disease and there is considerable deformation and some defoliation. SALD causes necrotic lesions with distinct damage and deformation. There is moderate sporulation and defoliation.

Many seedlings show some spotting by *Catacauma*, but the infections are not serious.

Ratings on the Cramer test are: 1 tree a No.2, 6 trees a No.3, 13 trees a No.4, and 6 trees a No.5.

Langford scale 7

F-1166 x Av.49

There are 85 seedlings in this progeny. Growth is even but not too vigorous. There is severe defoliation and some die-back of many seedlings. SALD causes spotting with necrotic lesions. There is often much damage and deformation, with moderate to heavy sporulation.

Some of the seedlings are heavily attacked by "Black Crust" - *Catacauma*, which causes damage and a certain amount of defoliation.

This is one of the poorest families even though a few trees have a fine appearance.

The Cramer ratings are: 6 trees a No.2, 27 trees a No.3, 26 trees a No.4, and 22 trees a No.5.

Langford scale 7-8

F-1276 x Av.49

There are 26 seedlings in this family. Growth ranges from poor to medium. In general, this is a poor family. Several of the trees have been partially or totally defoliated, and have suffered some die-back. South American Leaf Disease causes extensive spotting with lesions and much damage and deformation. Light sporulation was noted. Catacauma causes damage and defoliation.

Cramer ratings for the family are: 1 tree a No.1, 4 trees a No.2, 5 trees a No.3, 7 trees a No.4, and 9 trees a No.5.

Langford scale 8

F-1214 x Av.49

This seedling family is composed of 65 trees. Growth is very poor and the family is one of the poorest examined. There is much severe to complete defoliation with die-back. SALD causes much spotting with necrotic lesions and distinct damage to the leaves as well as deformation. Most of the seedlings show sporulation.

Catacauma causes minor spotting of the leaves, but there is little damage.

Cramer ratings are: 2 trees a No.2, 5 trees a No.3, 12 trees a No.4, 40 trees a No.5.

Langford scale 8-9

F-269 x Av.49

This is the largest family from the 1938 crosses and it is also the poorest. Growth has been very poor. Many trees suffer severe to complete defoliation, many having died-back or been killed. South American Leaf Disease causes spotting with necrotic lesions and deformation. There is moderate to heavy defoliation. Sporulation is very heavy.

There is light spotting by Catacauma

The Cramer ratings for the family are quite good, and they run as follows: 4 trees a No.1, 8 trees a No.2, 52 trees a No.3, 46 trees a No.4, and 106 trees a No.5.

Langford scale 8-9

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