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NUMBER 1.

FEBRUARY, 1959.

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JARRAH SEEDLING PLOTS - WILLOWDALE.

by A. C. van Noort.

Some interesting facts and figures regarding the survival and development of Jarrah seedling regeneration have been obtained from three plots established in 1941 near Willowdale in an area of dense germination following an uncontrolled fire.

The main points are:-

1. A rapid reduction in the number of plants per acre in the first few years from upwards of 18,000 in the first year, to approximately 1,500 after five years.
2. A much slower reduction in numbers in the next 12 years down to the vicinity of 500 per acre at age 17.
3. Very slow development of the advance growth, and no development at 17 years, of dynamic saplings.
4. Somewhat accelerated growth on ash beds.
5. Indications of a short term effect of superphosphate dressings at age 4 years.
6. No serious loss due to a light burn at age 4 years, but almost complete destruction by a more severe burn at the same age.
7. Vigorous development of coppice from fire damaged stems.

The Area.

The plots are located in Samson Block, compartments 3 and 5, which carried good sapling regrowth prior to 1941. In 1941 the area was burnt by a severe uncontrolled fire which apparently killed most of the smaller sizes back to ground level and resulted in a dense germination of Jarrah seedlings the following autumn.

The Plots.

Three plots were laid out in May 1941. Two of them consisted of strips 5 chains x 10 links giving 50, 10 link quadrats per plot. The other was 5 chains x 5 links giving 100, 5 link quadrats. Counts of the numbers of Jarrah seedlings in each quadrat were made in 1941 and recounts carried out in 1943, 1944, 1945, 1946, 1947 and 1958. The results of these counts are shown in Tables 1, 2 and 3.

Treatments.

In December 1945, at age 4 years, the plots were subjected to 5 treatments, as follows:-

1. Burn plus 2 cwts. superphosphate per acre.
2. Burn only.
3. Control - no treatment.
4. Two cwts. superphosphate per acre.
5. Eight cwts. superphosphate per acre.

One treatment was applied to each of the five one chain sections of each plot.

Survival figures, two years after the application of these treatments, were very variable, see Table 4, but some indications of effect of treatment were obtained, viz.:-

### Superphosphate

There are indications from these plots that dressings of superphosphate have improved the percentage survival 2 years after the application. Due to the wide variation in the results and the lack of sufficient replication, these figures are not significant but suggest that further experimentation is required.

### Burning.

On two of the plots which apparently received a mild burning treatment, survival was not significantly lower than the control. On the third plot the seedlings were almost completely destroyed by the burning treatment - See Table 3.

### Recent treatment of the Plots.

The area has been control burnt twice since 1947, in the spring of 1954 and 1957. In addition to the burning treatments in 1945 all the plots have thus been subjected to two light fires at the ages of 13 and 16 years.

Logging operations in the area in 1957 have spoilt plot number 3. A snig track actually follows along the line of the plot for about 2 chains - Table 3.

### Survival at seventeen years of age.

The high mortality rate in the first five years is shown in Tables 1, 2 and 3, where the numbers per acre are reduced from upwards of 18,000 down to the order of 1,500. Recruitment due to subsequent germination in these years was small.

Only plots 1 and 2 are suitable for comparison in 1958, the third being spoilt by the severe burning treatment in 1945 and the logging operations in 1957.

Examination of tables 1 and 2 shows that survival of the original regeneration amounts to 800 and 360 per acre respectively. In addition, a further 840 and 720 per acre respectively have germinated and survived since the 47 measurement.

### Development of regeneration after 17 years.

Subsequent growth of the seedling regeneration has been surprisingly slow. There has been no development of dynamic saplings and the tallest of the advance growth was only 2'6" high. Only about one fifth of the surviving seedlings have developed into strong advance growth. That is, over 12" high with a well developed lignotuber and numerous shoots. The remainder are 6"-12" high with a tuber about 1" diameter.

An explanation of this very slow growth of the seedling regeneration, lies in the vigorous development of coppice from the fire damaged stems. Undoubtedly, after the fire of 1941, this area was very open. It is now fairly well stocked with coppice growth 30'-40' high, in addition to dense patches of *Banksia grandis*. There are openings of reasonable size on the plots, where the regeneration should get away, but even here it is apparently suppressed, possibly by root competition from the vigorous coppice.

### Conclusions.

1. The development of lignotuberous advance growth to the stage where it is ready to commence dynamic height increment, can take more than 17 years.

2. Some idea of the ability of the regeneration to withstand fire is gained from the survival figures following the burning treatment at 4 years of age.
  3. The effects of superphosphate dressings and ashbeds suggest that some further investigation of the nutritional requirements of Jarrah regeneration, is warranted.
  4. The stagnation of the advance growth on these plots indicates the need for a study of the effects of competition on the development of Jarrah regeneration.
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JARRAH SEEDLING COUNTS.

5 chains x 5 lks. = 1/40th acre.

| Chainage                  | 0 - 1                      | 1 - 2 | 2 - 3                       | 3 - 4   | 4 - 5                       | Recruitment | Total | No. per ac. |
|---------------------------|----------------------------|-------|-----------------------------|---------|-----------------------------|-------------|-------|-------------|
| Initial Count<br>May 1941 | 283                        | 50    | 53                          | 12      | 73                          |             | 471   | 18,840      |
| Recount 1943              | 163                        | 36    | 45                          | 6       | 28                          |             | 276   | 11,040      |
| " 1944                    | 54                         | 18    | 26                          | 3       | 10                          |             | 111   | 4,440       |
| " 13/7/45                 | 27                         | 12    | 18                          | 3       | 8                           |             | 68    |             |
|                           | -                          | 7     | 2                           | 4       | 4                           | 17          |       |             |
|                           | 27                         | 19    | 20                          | 7       | 12                          |             | 85    | 3,400       |
| Treatment 21/2/45         | Burn +<br>2 cwt.<br>Super. | Burn  | 8 cwts.<br>Super<br>per ac. | Control | 2 cwts.<br>Super<br>per ac. |             |       |             |
| Recount 29/8/46           | 8                          | 9     | 16                          | 6       | 4                           |             | 43    |             |
|                           | -                          | 1     | 5                           | 1       | -                           | 7           |       |             |
|                           | 8                          | 10    | 21                          | 7       | 4                           |             | 50    | 2,000       |
| Recount 25/9/47           | 4                          | 8     | 21                          | 5       | 3                           |             | 41    |             |
|                           | 1                          | -     | -                           | -       | -                           | 1           |       |             |
|                           | 5                          | 8     | 21                          | 5       | 3                           |             | 42    | 1,680       |
| Recount 1/12/58           | 3                          | 3     | 9                           | 4       | 1                           |             | 20    | 800         |
|                           | 12                         | -     | 5*                          | 2       | 2                           | 21          |       | 840         |
|                           | 15                         | 3     | 14                          | 6       | 3                           |             | 41    |             |

\* Well developed Advance Growth - Less than 11 y.o. - on an Ashbed.

\*\* Regeneration over 11 y.o.

PLOT NO. 2.

5 chains x 10 links = 1/20th acre.

6.

JARRAH SEEDLING COUNTS.

TABLE 2.

| Chainage.     |          | 0 - 1                                  | 1 - 2                | 2 - 3         | 3 - 4                | 4 - 5         | Recruitment | Total | No. per ac.  |
|---------------|----------|--|----------------------|---------------|----------------------|---------------|-------------|-------|--------------|
| Initial Count | May 1941 | Total 189                              | 143                  | 136           | 65                   | 41            |             | 573   | 11,460       |
| Recount       | 1943     | Total 98                               | 104                  | 90            | 40                   | 27            |             | 359   | 7,180        |
| "             | 1944     | Total 61                               | 52                   | 54            | 16                   | 20            |             | 203   | 4,060        |
| "             | 13/7/45  | Survivors 35<br>Recruits -<br>Total 35 | 28<br>2<br>30        | 40<br>3<br>43 | 12<br>3<br>15        | 12<br>-<br>12 | 8           | 127   | 2,700        |
| Treatment     | 21/12/45 | 2 cwt. Super per ac.<br>Control        | 8 cwt. Super Per ac. | Burn          | Burn + 2 cwt. Super. |               |             |       |              |
| Recount       | 29/8/46  | Survivors 28<br>Recruits -<br>Total 28 | 13<br>-<br>13        | 34<br>1<br>35 | 5<br>1<br>6          | 7<br>-<br>7   | 2           | 87    | 1,780        |
| Recount       | 25/9/47  | Survivors 24<br>Recruits -<br>Total 24 | 8<br>-<br>8          | 20<br>-<br>20 | 5<br>-<br>5          | 7<br>-<br>7   |             | 64    | 1,280        |
| Recount       | 1/12/58  | Survivors 10<br>Recruits 1<br>Total 11 | 1<br>1<br>2          | 1<br>11<br>12 | 3<br>18<br>21        | 3<br>5<br>8   | 36          | 18    | 360**<br>720 |

\*\* Regeneration over 11 y.o.

JARRAH SEEDLING COUNTS.

PLOT NO. 3.

5 chains x 10 links = 1/20th acre.

| Covainage                 |                     | 0 - 1                       | 1 - 2   | 2 - 3                       | 3 - 4 | 4 - 5                       | Recruitment | Total | No. per ac. |
|---------------------------|---------------------|-----------------------------|---------|-----------------------------|-------|-----------------------------|-------------|-------|-------------|
| Initial Count<br>May 1941 | Total               | 160                         | 139     | 45                          | 100   | 136                         |             | 582   | 11,640      |
| Pejount 1943              | Total               | 76                          | 76      | 29                          | 61    | 119                         |             | 361   | 7,220       |
| " 1944                    | Total               | 45                          | 34      | 15                          | 22    | 51                          |             | 167   | 3,340       |
| " 13/7/45                 | Survivors           | 32                          | 26      | 10                          | 9     | 42                          |             | 119   |             |
|                           | Recruits            | 7                           | 4       | -                           | 1     | 2                           | 14          | 133   | 2,660       |
|                           | Total               | 39                          | 30      | 10                          | 10    | 44                          |             |       |             |
| Treatment 21/12/45        |                     | 2 cwts.<br>Super<br>per ac. | Control | 8 cwts.<br>Super<br>per ac. | Burns | Burns +<br>2 cwts.<br>Super |             |       |             |
| Account 29/8/46           | Surviv-<br>Recruits | 34                          | 18      | 7                           | 0     | 2                           |             | 61    |             |
|                           | Total               | 34                          | 19      | 7                           | -     | 2                           | 1           | 62    | 1,240       |
| " 25/9/47                 | Surviv-<br>Recruits | 25                          | 12      | 6                           | 0     | 1                           |             | 44    |             |
|                           | Total               | 25                          | 15      | 6                           | -     | 1                           | 3           | 47    | 940         |
| " 1/12/58                 | Surviv-<br>Recruits | 3                           | 0       | 0                           | 0     | 0                           |             | 3     | 600         |
|                           | Total               | 3                           | 4       | 2                           | 29    | 2                           | 37          | 40    | 740         |

\* Apparently a severe burn which destroyed practically all seedlings.  
 † New seedlings germinated on snig track.  
 ‡ Regeneration over 11 y.o.  
 Note that recent logging operations 1957 have spoilt this plot.

TABLE 4.

JARRAH SEEDLING COUNTS.SURVIVAL PERCENT AFTER 1945 TREATMENT.COMPARING THE 1947 COUNT WITH THE 1945 COUNT.

| Plot | Control | 2 cwts.<br>Super<br>per ac. | 3 cwts.<br>Super<br>per ac. | Burn | Burn +<br>2 cwts.<br>Super<br>per ac. |
|------|---------|-----------------------------|-----------------------------|------|---------------------------------------|
| 1    | 57      | 25                          | 75                          | 37   | 15                                    |
| 2    | 27      | 69                          | 44                          | 27   | 58                                    |
| 3    | 37      | 64                          | 60                          | 0    | 2                                     |