Crown Vigour Observations

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CROWN VIGOUR OBSERVATIONS

Qualitative observations have been made, using binoculars to study crown vigour from the following points of view -

1. development of new leaves.
2. growth of flower buds and flowering.
3. setting of fruit and seeding.
4. general crown vigour as expressed by crown volume.

The amount of leaves carried by the crown can be described by the density of leaves, by the depth of crown and by the spread of crown. Each of these factors may be described in relative values as good (called 3), as medium (called 2), or as poor (called 1). The three factors may bemultiplied together to form a series of crown volume values and the values obtained may be made to conform to arbitrary crown volume classes as follows :-

Crown Volume Classes.

	A.	(Good	= 12^{+}
	B.	(Medium)	= 6, 8 or 9.
	C.	(Poor)	= 3 or 4.
and	D.	(Very Poor)	= 2 or 1

5. longevity of leaves.
6. crown deterioration in the Northern Jarrah forests.

Some observations have been made on Jarrah (Eucalyptus marginata).

I. The relative growth of new leaves has been described as

fair	1952/53
poor	1953/54
good	1954/55 and 1955/56.

2. A general flowering has been recorded for November and December, 1953, and one tree in four carried abundant blossom. Flowering towards the end of 1952, 1954 and 1955 has been described as scattered or light. It has been noted that flowering at the end of 1953 has not been followed by the usual growth of new leaves in the early summer months, but that this flowering has corresponded with a poor production of new leaves early 1954.

3. The amount of fruit on 43 trees has been described as follows :- few or none, few or some, many, and abundant.

Table 1. Number of Jarrah Trees.

Summer	1952/53	1953/54	1954/55	1955 (Winter)	1955/56
Amount of Fruit	Mature	Immature	Mature		
Abundant	-	5	6	3	3
Many	-	16	9	7	10
Few or Some	-	4	11	12	16
Nil or one branch-let only	43	18	17	21	14

4. The general crown vigour for the same 43 trees has been described by the crown volume classes as shown in the Table 2.

Table 2. Number of Jarrah Trees.

Crown Volume Class	1953/54	1954	1954/55	1955	1955/56
A = 12^{+}	5	6	1	5	7
B = 6, 8, 9	12	16	14	16	21
C = 3, 4	15	15	19	15	13
D = 2, 1	11	6	9	7	2

A deterioration in crown vigour is recorded for the summer 1954/55.

Discussion: There is evidence (early 1954) that a poor development of new leaves follows successful fertilisation of abundant flowers (late 1953). Very little growth in new leaves has been recorded early 1954 and the first apparent loss in vigour appears twelve months later in the summer early 1955. The seed year then (early 1955) would indicate abundant flowering and setting of immature fruit twelve months earlier.

On the other hand, a vigorous growth in new leaves has been recorded in the summer early 1955. This growth has been accompanied by a leaf fall. It is probable that the new growth is partly responsible for leaf fall at this time. Crown vigour appears poor until the end of the summer growing period when the amount of new leaves produced contribute sufficiently to crown volume to find expression in vigour, by crown volume classes.

There are definite indications that the vigour of trees is influenced mostly by two season's growth. Support is given to these observations also, when it can be shown that about half of the leaves of one season's growth may live for one year, and the other half of the leaves produced in that season may live for two years.

5. Longevity of leaves.

Leaf Count at end of March - After the Summer Fall

Species Tree No.	New Leaves	Leaves held		New Leaves	Leaves held		New Leaves	Leaves held	New Leaves
	1953	1954	1955	1954	1955	1956	1955	1956	1956
E.marginata									
No.15				25	10	1	65	44	31
14				38	36	17	24	24 (dormant)	12
13				26	19	-	48	21	38
12				23	11	-	40	25	30
11				42	29	-	52	19	37
Total Identified				154	105	18	229	133	148
Percent				100%	68%	12%	100%	58%	100%
No.10	40	20	12	55	55	2	Dormant	x	23
9	55	30	3	57	50	4	44	32	35
8	42	26	1	56	51	-	27	14	34
7	52	29	5	55	49	1	46	20	32
6	35	20	-	60	28	-	27	9	28
5	31	5	-	60	38	-	Damaged	x	31
4	46	-	-	Damaged)	cut back to stool		18	15	20
Total Identified	301	130	21	343	271	7	162	90	203
Percent	100%	43%	7%	100%	79%	2%	100%	56%	100%

Life of Leaves:

The table would indicate that 40% (±20%) of a season's growth may live 12 to 15 months, and that 60% (±20%) may live 24 to 27 months. There are a few leaves included in the first figure (40%) which may live less than 12 months. Included in the second figure (60%), there are a few leaves which may live about 18 months, and a few leaves which may live more than 27 months. The amount of leaves living about 6 months, and about 18 months, and about 30 months is of the order 7% (±5%) in each instance. Less than 5% of the leaves may live for three years.

Life of Leaves and Height Growth:

It has been noted that dormant crowns tend to hold old leaves, and that crowns making height growth tend to grow new leaves and to cast off the old ones.

Life of Leaves and Growth of the Sapling Crown:

Leaves which have the shortest life are those produced in the uppermost horizon of the growing sapling crown. This horizon has a pronounced upward and outward extension of the crown with the production of new leaves, and loss of leaves up to 15 months old. Middle horizons of the crown do not make height growth. The upper middle horizon has a small increase in lateral spread, and produces new leaves which may live to 27 months. The lower middle horizon produces new leaves, but the lateral spread of the sapling crown is not much affected by the growth of these leaves. The lowest horizon does not produce new leaves and the branches die and are cast.

When the uppermost horizon extends upwards and outwards it would be unusual for leaves to remain on the branchlets for three years. A sapling enjoying normal growth may retain leaves for three years, however, when it passes a normal growing season in the dormant condition. Then some of the leaves in the middle horizons at that time may be retained for another growing season before they are cast. Alternatively, when a crown is in the stagnant state, the leaves may live in situ for three years.

6. Crown Deterioration in the Northern Jarrah Forest:

It has been recorded that nearly every year, after flowering, there is a vigorous growth of new leaves in December or January; but after a heavy flowering and successful fertilisation and setting of immature seed, there is poor development of new leaves, and the vigor of these fruiting trees apparently suffers.

Also it has been recorded that during the early summer growth, the new flower buds are produced in the axils of the new leaves. At late autumn or early winter the relationship between the development of flower buds and of new leaves, leads to some interesting comparisons which can be made on the expression of vigour in decadent crowns. The healthiest of these poor crowns may carry new leaves and flower buds on the branchlets. Very poor crowns may carry flower buds on the branchlets, but very few new leaves. Newly bare branchlets may also be observed on these trees. Other very poor crowns may carry newly bare branchlets in abundance. These trees may not carry any flower buds, and only a very few leaves.

A similar poor condition of the individual crowns occurs on dying Jarrah patches on the poorer site qualities. The progress of the disorder called Dying Jarrah has been described by Wallace and Hatch, who have recorded - "The death of the Banksia grandis understory may occur up to two years prior to the death of the Jarrah and, if a dying area is extending, the direction of the extension can be noticed by the early death of the Banksia. This change is followed by the gradual death of the Jarrah. With Jarrah the disorder causes a progressive crown deterioration, leading to the sudden death in the final stage of the tree. In some cases, after the death of the crown, epicormic shoots may appear on the tree bole prior to the death of the tree."

The extent of association between the dying crowns of the dying Jarrah patches and the general crown deterioration of the Jarrah forest has not been established.

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