KARRI SEED SAMPLING

by P. Christensen.

Large areas of Virgin Karri are cut over by the mills every year. Since Karri is a valuable timber tree and its growth rate compares favourably even with the fastest exotics, these areas are usually regenerated naturally to Karri. In the past, Karri was managed on a group selection system but recently a system of clear felling with seed trees has been adopted in many areas. Since this means that there are less seed trees per unit area, it has become increasingly important to know as accurately as possible the amount of seed available in the crowns and also when it will be available.

A glance at Graph 1 (page 4) will reveal that the problem of seed supply is not a new one; records of seed years have been kept since 1925, so one may assume that it was considered important even in the early days. A more interesting fact also revealed by this graph is that in general, seed years only tend to occur every 4-5 years. It is important therefore to be able to forecast these years well ahead if possible.

From at least 1956 onwards, 1/10 mil/acre seed trays have been used under Karri canopy in various locations to give a quantitative measure of seed supplies.

The numbers of the various floral stages (Pin buds, cylindrical buds, Clavate buds, opercula, hypanthia, immature capsules, and mature capsules) collected were recorded, and the approximate No. /acre could be calculated.

Fortunately the Eucalypt flower opens by the opercula or cap, on the end of the bud abscising from the rest of the bud or hypanthia (flower cup). Thus the number of opercula shed per acre represents the number of opened flowers per acre. By adding the number of Pin buds, cylindrical buds, or clavate buds previously collected from the area, we can calculate the amount of each stage that were present per acre at the time. Further, by subtracting the number of hypanthia and immature capsules subsequently collected we can make an estimate of the numbers of mature capsules present per acre.

Complete records of seed tray sampling exists for the last ten years, and it has been possible to use these to calculate the numbers of each floral stage present per acre in any one year. This has been done for two complete floral cycles in Fringe Karri areas, e. g. Wheatley, Glenoran, Northcliffe, Shannon River; and Central Karri areas, e. g. Pemberton.

Graph II illustrates how a percentage of each floral stage is lost as one progresses through the floral cycle towards mature seed-bearing capsules. Fringe and central Karri are remarkably similar, indicating that the Karri in different areas follows the same general pattern. The two cycles 1959 - 62 and 1963 - 66, whilst differing by some 15 - 20%, still exhibit similar curves. The former was a rather poor seed cycle and the latter a very good one; thus by using the mean we get a graph which should express an average year.

This graph can be used to estimate what percentage of any given crop of Pin buds, cylindrical buds, etc. are likely to reach full maturity as seed-bearing capsules. Thus Graph III illustrates the adapted version which can be used to read off directly the percentage of a crop of pin buds or cylindrical buds, etc. which is likely to reach maturity under normal average conditions. The season in which they are likely to mature can also be forecast and a further additional part of the curve allows an estimate of the number of capsules likely to carry over into successive seasons.

A figure of 1 seed/capsule is used when estimates of seed per unit area are made. This figure can be considered conservative.

Seed trays are no longer used in routine sampling, the "twig count" method is employed instead. This method is based on the fact that it has been variously calculated that there are approximately 10, 000 twigs per sq. chain of crown area in the capsule bearing region in an average Karri stand. Using hand samples taken either from felled trees or from standing trees by Rifle Shot sampling, the number of twigs, Pin buds, cylindrical buds, etc. present are counted and used to calculate the numbers of each floral stage present per 1/10th acre.

The advantages of this method over that of the seed tray method are that it is a more direct method, it is quicker and involves less work. Also it enables the entire Karri area to be sampled by a few people, ensuring that sampling is the same in all areas.

Now if we have an estimate, calculated from hand samples, of the number of pin buds present per sq. chain of crown area, it is possible by consulting Graph III to calculate approximately what percentage of these buds are likely to reach maturity as ripe capsules; e. g., If we had 400, 000 Pin buds per sq. chain of crown area and sampling had been done in Sept., 1968 we would consult the graph, Region I, Sept., and find that about 27% of them are likely to reach maturity; i. e. 108, 000 will become mature capsules. They will reach maturity in Region 4 (they are now in Region1),

Graph 1

Karri seed years over the past forty-three years.

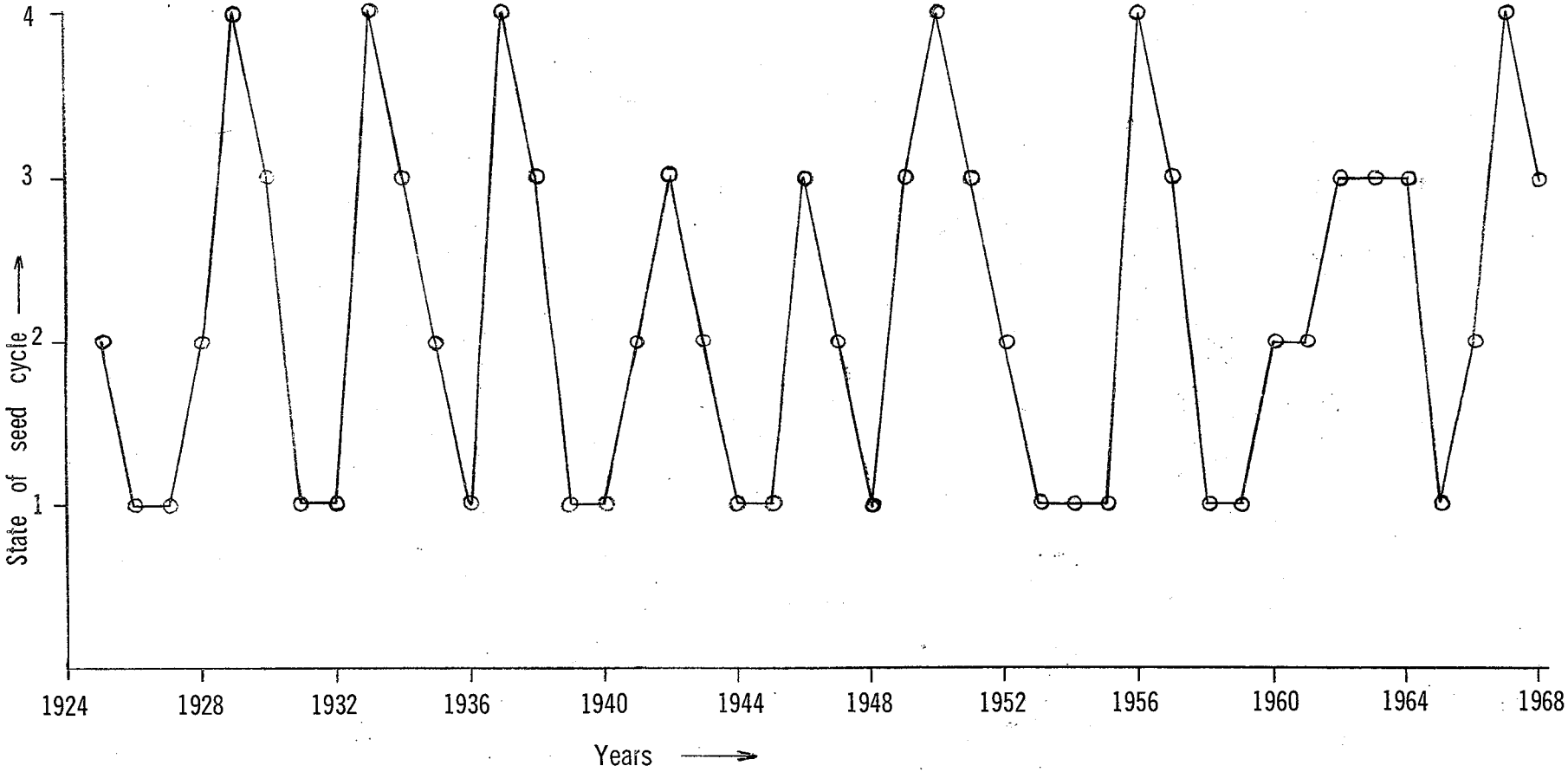
State of seed cycle.

1 = Seed – none to rare

2 = Seed – local only

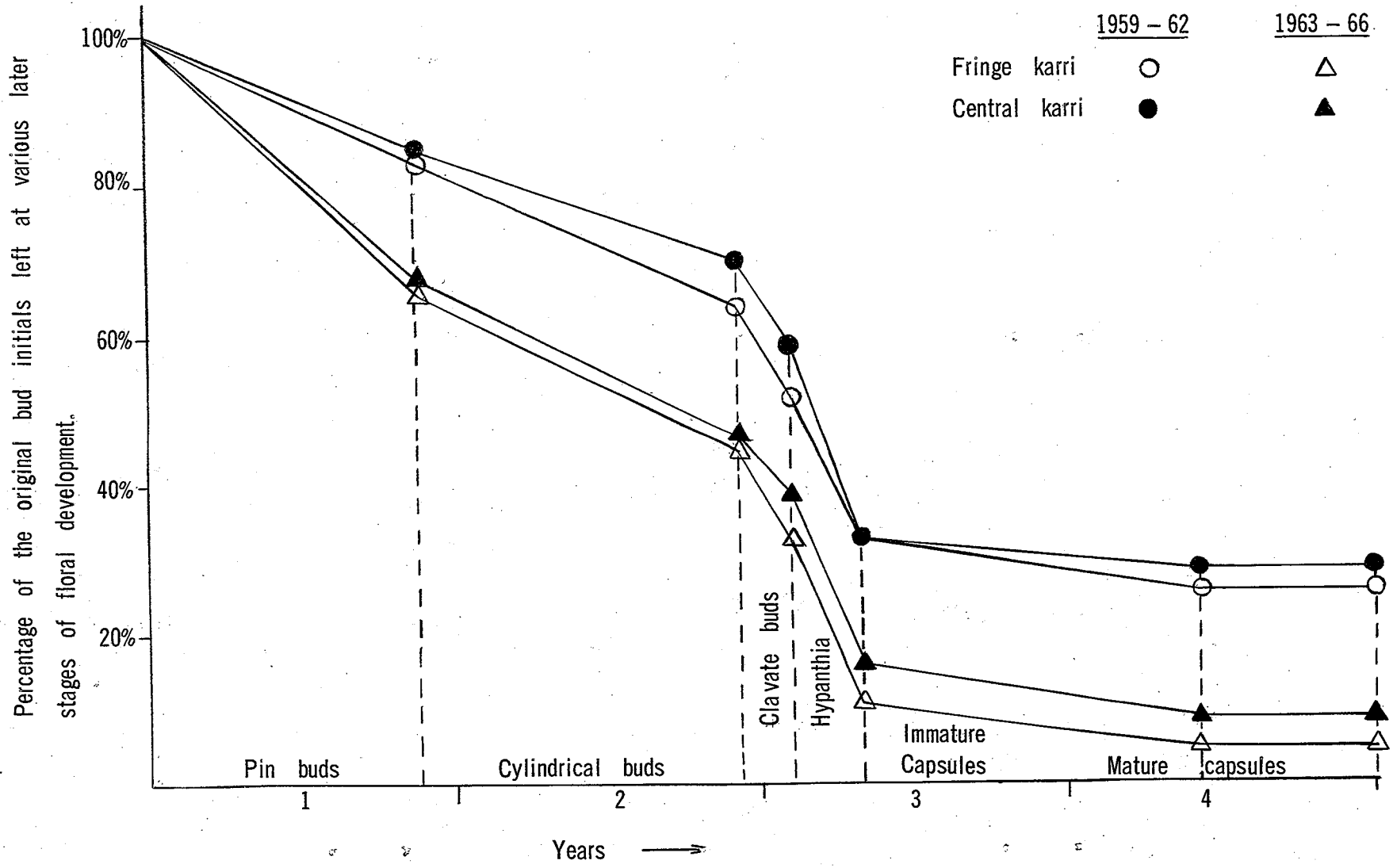
3 = Good seed years

4 = Main seed years

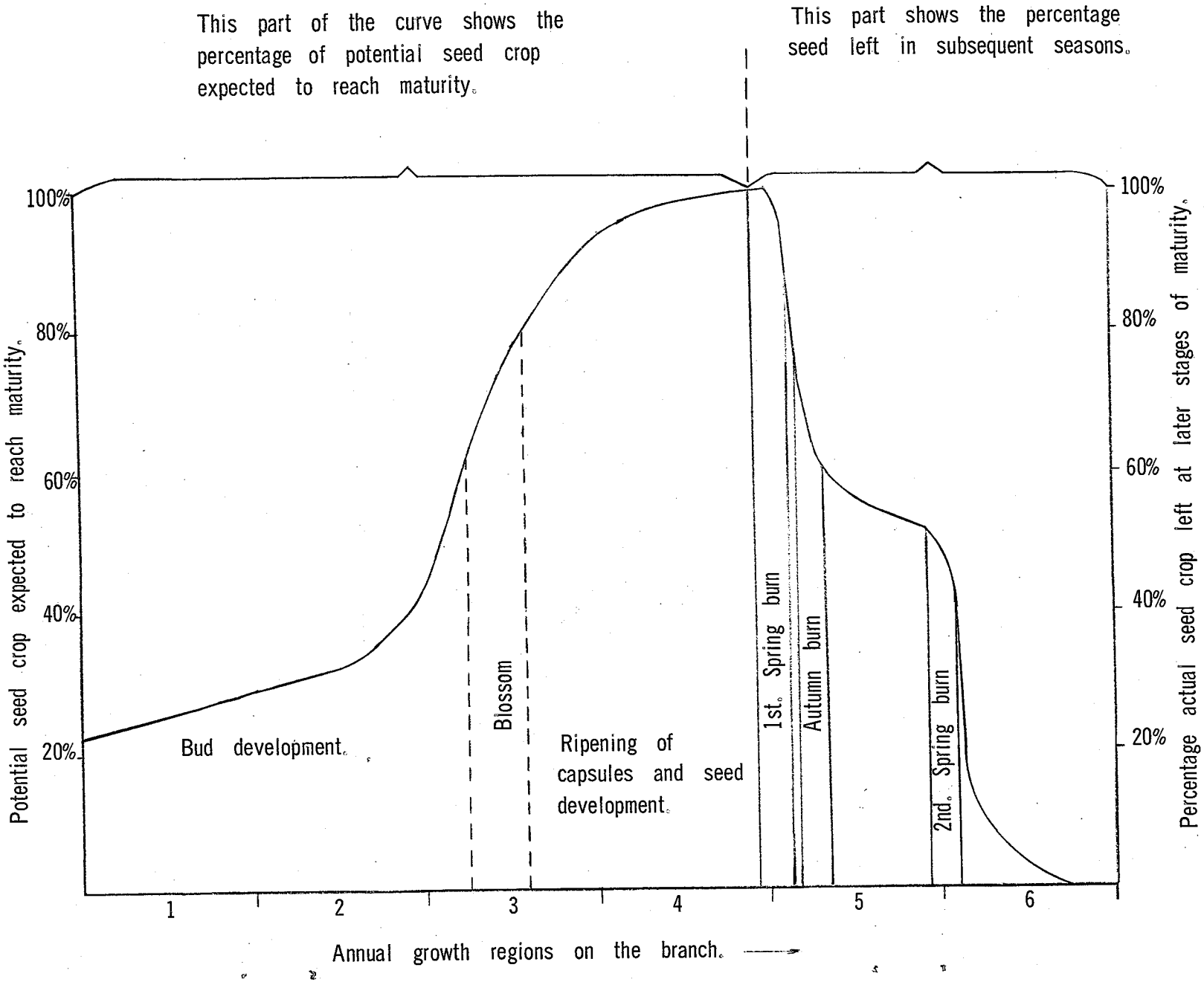


Graph II

This graph illustrates how a percentage of the various floral stages drop off as the floral cycle progresses towards mature seed-bearing capsules.



Graph 111


This part of the curve shows the percentage of potential seed crop expected to reach maturity.
This part shows the percentage seed left in subsequent seasons.
100%
80%
60%
40%
20%
Potential seed crop expected to reach maturity.
Bud development.
Blossom
Ripening of capsules and seed development.
1st. Spring burn
Autumn burn
2nd. Spring burn
Percentage actual seed crop left at later stages of maturity.
1
2
3
4
5
6
Annual growth regions on the branch.

therefore they will be mature in Spring, 1971. Since we assume 1 seed per capsule, it is estimated that approximately 108,000 seeds per sq. chain of crown area will be available in Spring, 1971. If the burn is delayed till Autumn, about 60% should still be left; i.e. about 65,000 seeds, or in Spring 1972 there should still be 54,000 seeds available per sq. chain of crown area.

Estimates of this nature will in future be carried out in each of the SMP's where Karri is cut, twice a year, once in Spring and once in Autumn. The sampling will be carried out in the areas where the mill happens to be felling at the time. These estimates can be taken to be an estimate of the seed for the area in the general neighbourhood of the felling where the sampling was carried out.

Adjacent areas do not, as a rule, differ widely. Thus with twice yearly samplings being carried out, fairly reliable estimates of future seed supplies should be available two or three years before seedfall. A record in the form of a Histogram will be kept at the Manjimup Research Station for each SMP, so that an overall picture of the state of the Karri seed cycle will be available at any time.

The emphasis throughout has been on similarity rather than differences in seed crops. This does not mean that we are unaware of the tremendous differences which may exist between two adjacent areas or two adjacent trees and even adjacent branches on the same tree. However, on the whole, adjacent areas are usually similar, and though trees in one area may differ widely it has been shown recently that a fairly small but representative sample will give a good estimate of the area in general. The main aims of the method are to provide some sort of "system" in the sampling so that reliable records of the Karri floral cycle can be kept. Thus records for one seed cycle will be comparable with those of any other since similar methods were used to compile them. This will enable one to refer back later if Regeneration failures occur and perhaps gain some understanding from them. It is also hoped that the estimates will be of some use in planning Karri operations in the field.

P.S. This sampling for forecasting future seed supplies should not be confused with the "confirmation of seed supplies sampling" done just prior to Regeneration burning.