DR. HOPKINS.

CONE COLLECTION COSTS

1. Cockatoo Picked Cones.

10 Wheatsacks (23.1/3 bushels) of cones were collected from the ground and bagged in 450 man minutes.

Based on a 40 hour week and a basic wage of $33.50 these cones cost $0.27 per bushel.

As a bushel of cones yields about 1½ lbs of seed, the cost of this seed to this stage is $0.18 per lb.

2. Climber Picked Cones.

3 Wheatsacks (7 bushels) of cones were collected by climbing and were bagged in 180 man minutes.

Based on a 40 hour week and a basic wage of $33.50 these cones cost $0.36 per bushel.

As a bushel of cones yields about 1½ lbs of seed the cost of the seed to this stage is $0.27 per lb.

For details and description of trees climbed see my report dated 27.10.66.

The above figures could be used as a basis on which to calculate piece work rates for cone collection under similar conditions.

SR. FORESTER

COMO
DHP:RHS
3.2.66

WORKING PLAN NO.....

OBJECT

To determine the earliest possible date for the collection of Pinus pinaster cones which will yield seed of acceptable viability.

OFFICER RESPONSIBLE

Sr. Forester D.H. Perry and staff of Tree Breeding Station. Dr. Hopkins after July 1967.

DATE OF INAUGURATION.

15th January, 1967.

LOCATION

Tree Breeding Station at Wanneroo Forest H.Q. and Neaves Scion orchard.

AIM OF INVESTIGATION

One of the methods which could be used to reduce the hazards of Black Cockatoo attack on ripening cones, is to reduce the time the cones remain on the trees to a minimum. With the object of determining when this date might be it is proposed to make collections of cones at one monthly intervals commencing in January 1967 and continuing through to September. Cones will be stored at room temperatures at the Research Institute at Como until early December 1967 where the seed will be extracted, stored until March and then stratified and tested. It is desired to avoid testing the viability of this seed in November, December and January when experience has shown the seeds of this species to be very dormant.

The earlier that cones can be collected, the shorter the period that they will be exposed to damage by cockatoos.

COLLECTION TIMES

Collection of cones will take place between the 15th and 20th days of each month commencing in January 1967 and terminating in September 1967.

CONE STORAGE

Cones are to be placed in plastic bags and tied and labelled both inside and outside each bag.

Care should be exercised to keep the bags intact. The object of storing in plastic bags is to slow down moisture loss.

All collections must be stored in the same room until 1st December, 1967.

cont'd.../2

CLONES FROM WHICH CONES ARE TO BE COLLECTED.

Neaves Scion Orchard.

Clone No.	No. of Cones
E24	10
E47	10
E19	5
E22	5
E32	5
E37	5

The cones of each clone are to be left separate.

SR. FORESTER

COMO
DHP:RHS
10.1.67

DR. HOPKINS

SEED COLLECTION - CLEANING P. PINASTER

As discussed I paid a visit to the C.S.I.R.O. Plant Introduction Centre at Kelmscott to examine the seed cleaning machines in use there.

Two types are used:-

1. Four beaters with rubber tips revolve in a cylinder. Distance between these tips and the cylinder wall is adjustable.

2. A rotating drum inside a cylinder is fitted with metal grooves through which the seed passes as the drum rotates. The distance between these grooves and the outside drum can be adjusted.

Samples of P. pinaster seed were put through each machine. No.1 in its present form is most unsatisfactory for conifer seed. A high percentage of the seed is broken up. The rubber pads are very stiff and perhaps with softer pads a better result would be obtained.

No.2 machine was fairly satisfactory although again some seed is broken. Two passes through this machine are necessary to remove all wings.

In their present form neither of these machines is superior to the experimental dewinger I have made up and tested. This machine is based on the dewinger used by Sr. Paiva Neto in Portugal but scaled down to meet our more modest requirements. I was not able to see inside his machine but he did give me a verbal description. The prototype I have made up has a revolving shaft inside a cylinderical drum. The shaft is fitted with vanes which break the wings off and at the same time impel the seed through the drum to the exit.

This prototype dewinger has been tested and about 20 lbs. of Pinus pinaster seed satisfactorly dewinged. Germination tests of this seed have been put down plus a hand dewinged control and are sufficiently advanced to indicate that this method of dewinging does not impair the viability of the seed.

Tests indicated that a speed of 250 to 300 revolutions per minute gave best results.

I would recommend that we have a dewinger made similar to the prototype I have mocked up. I have discussed this with Mr. Welch who assures me that this could be made at Gnangara.

Requisition is attached hereto for approval.

SR. FORESTER

COMO
19.1.67
DHP:RHS

DR. HOPKINS

Following your instruction the two following lots of Pinus pinaster seed have been handed to Miss Gerke for storage:-

Lot 1 — 2 lbs. Pinus pinaster (Leiria)

Cones collected from trees in West Gironde Block of Gnangara Plantation on 24th Oct. 1966.
Seed extracted Dec. 1966.

S.N.3890

Lot 6 — 4 lbs. 12 ozs. Pinus pinaster (Leiria)

Cones dropped by cockatoos prior to October 1966 in which month they were picked up and bagged.
Seed was extracted Dec. 1966.
Compt. 75 South Lane - Poole Block - Gnangara Plantation.

Lots 2, 3, 4, 5, 7 and the balance of lot No.1 (8lbs. 11½ ozs.) have been handed to the seed store for recording and storage. (SEE LETTER ATTACHED)

SR. FORESTER

COMO
DHP:RHS
23.1.67

MR. WATSON.

PINUS PINASTER SEED

The following lots of Pinus pinaster seed have been delivered to your for storage:-

LOT 2 — 12 lbs. 5 ozs. Pinus pinaster (Leiria)
S.N. 3885.
Cones dropped by cockatoos prior to may 15th 1966 on which date they were picked up and bagged.
Seed extracted Dec. 1966.
Compt. 75 South Lane-Poole Block Gnangara Plantation.

LOT 3 — 11 lbs. Pinus pinaster (Leiria)
S.N. 3886.
Wind pollinated seeds from grafts in Neaves Scion Orchard.
Collected October, 1966.

LOT 4 — 13¼ osz. Pinus pinaster (Landes)
S.N. 3887.
Wind pollinated seeds from grafts in the Neaves Scion Orchard.
Collectdd October, 1966.

LOT5 — 3 lbs. ½ oz. Pinus pinaster
S.N. 3888.
Cones collected from large felled pine at Wanneroo H.Q.
Collected May, 1966.

LOT 7 — 2 lbs. 11½ ozs. Pinus pinaster (Leiria)
S.N. 3889.
Cones dropped by cockatoos prior to July 1966 in which month they were picked up and bagged.
Seed was extracted Dec. 1966.
Compt. 72 South Lane - Poole Block - Gnangara Plantation.

Would you please have cards made out and serial numbers allotted to this seed. A B.U. should be placed on this correspondence for April 1st 1967 to Dr. Hdpkins, who will arrange stratification and testing.

SR. FORESTER

Como
DHP:RHS
23.1.67

DR. HOPKINS

PINUS PINASTER SEED. COLLECTION DATA

1. Climb Seed - West Gironde Block. Gnangara

Further to my report dated 27th Oct. 1966 in which details are given of the climbing of 44 selected trees for cones, the following data has now been obtained:-

LOT 1.

S.N. 3890

6.33 bushels of cones collected.
105 cones per bushel
10 lbs. 12 ozs of clean seed obtained
1 lb. 10 ozs of seed per bushel of cones
62 cones produce 1 lb. of clean seed
.259 ounces of seed per cone
157 seeds per cone
9,712 seeds per 1 lb. weight of clean seed

2. Fallen Cones - Result of Cockatoo Activity

Three bags of cones containing 7 bushels were collected from under the pines in Compt. 75 South Lane-Poole Block Gnangara on May 15th 1966.

S.N. 3885

Each wheat sack was filled to the point where the top could just be gathered and tied. Such a sack full of cones was found to hold 2.1/3 bushels.

LOT 2

These cones were stored in a shed in the bags until early December 1966 when they were dried by solar heat and the seeds extracted.

The following data relating to the seed and seed yield was then obtained:-

7 bushels of cones
108.5 cones per bushel
12 lbs. 5 ozs of clean seed obtained
1 lb. 11½ ozs of seed per bushel of cones
63 cones yield 1 lb. clean seed
.255 ounces seed per cone
140 seeds per cone
8,800 seeds per lb.

A further collection of cones was made from Compt 75. in July 1966. This collection was stored until early December 1966 and the cones were then dried by solar heat and the seed extracted and cleaned.

LOT 7.

S.N. 3869

2 lbs. 11½ ozs of clean seed obtained.

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3. Wanneroo Headquarters

Cones were collected from a very large tree which was felled at Wanneroo Headquarters in August 1966. Cones were stored in a shed until early December 1966 when the seed was extracted by solar heat.

LOT 5
S.N. 3888

3 lbs. ½ oz of clean seed was obtained.

This tree is considered to be of Leirian origin based on appearance and time of flowering.

4. Half Sib Seed From Neaves Scion Orchard, Leiria

(a) Collected from Ramets Planted in 1959. Wind Pollinated.

85 cones yielded 14½ ounces of seed.
.170 ounces of seed per cone.

(b) Collected from Ramets Planted in 1960. Wind Pollinated

LOT 3

343 cones yielded 3 lbs. 15½ ozs of seed.
.185 ounces of seed per cone.

(c) Collected from Ramets Planted in 1961. Wind Pollinated

S.N. 3866

304 cones yielded 3 lbs 4 ozs of seed
.171 ounces of seed per cone.

(d) Collected from Ramets Planted in 1962. Wind Pollinated

314 cones yielded 2 lbs. 15 ozs of seed.
.150 ounces of seed per cone.

5. Half Sib Seed from Neaves Scion Orchard, Landes

(a) Collected from Ramets planted in 1961 & 1962. Wind Pollinated

117 cones yielded 13¼ ozs of seed.
.113 ounces of seed per cone.

LOT 4

This seed has all been handed into our seed store for allocation of serial numbers and storage.
S.N. 3867

I will arrange for the testing of the May & July collections and also the climb seed from West Gironde Block.

SR. FORESTER

COMO
DHP:RHS
9.1.67

DR. HOPKINS

PINUS PINASTER SEED PRODUCTION AND
BLACK COCKATOOS.

I would like to recommend that we initiate some exploratory tests to determine to what extent it is possible to protect an area from attack by these birds. I have in mind the use of scare guns on two sites, namely the Neaves Scion orchard and the Dendrograph plots in the South Lane Poole block of the Gnangara Plantation.

Apart from actual patrolling, the scare guns offer the only known practicable solution to the problem at the present time, and I consider we should evaluate their effectiveness.

There are two problems facing us at the moment:

1. To keep the birds out of the Neaves Scion orchard altogether so that costly high quality seed can ripen on the trees.

2. To keep the birds away from the Lane-Poole block until the cones are well past the green stage - about March 31st. They can then be allowed access and we can collect and ripen all the cones they drop.

(See previous reports)

I have made inquiries as to the availability and costs of scare guns with the following results:

1. Two types of gun are available, one using carbide gas as an explosive and the other using L.P. (Kleenheat) gas. We know from past experience that carbide gas guns are not very reliable in service, blockages in the generating system being the main trouble. This means fairly regular and constant servicing which can be expensive in isolated positions. The agents assure me that the L.P. gas gun is much more reliable in service and one would certainly expect this to be the case.

   Both types cost the same, approx. $80.00 plus freight from the Eastern States less 10% to the Govt. They are sold by Patterson and Co of 11 Cliff Street, Fremantle and my contact there was a Mr. Hosking.

   If we can demonstrate that these guns are effective we could further perfect them by using a timing device to turn them off at night and on in the morning.

   I would strongly recommend that three L.P. gas scare guns be purchased for trial.

In addition to the forgoing I wish to recommend that we test the feasibility of keeping the birds away from the Leiria race trees around the Research Institute buildings at Como. These trees are carrying a good crop of cones which if protected would give us experience in climbing for seed - calculating cone yield, etc.

.../2

For this purpose I recommend that I transfer to Caretaker Moulds the12 guage shotgun on issue to me, and that he uses this whenever necessary to scare the birds. I do not consider that it will be necessary to kill them - just firing the gun will frighten them away. I doubt if actually killing them would be any more effective as it would not be possible to shoot enough of them.

SR. FORESTER

COMO
EHP:RHS
13.12.66

DR HOPKINS.

PINUS PINASTER CONE COLLECTION.

On the 25th October this year some climbing was carried out to collect cones from Pinus pinaster trees in the free growth trials in West Gironde at Gnangara. Unfortunately due to pressure of other urgent work, this project lost most of its value. Cockatoos had invaded the area in considerable force within the last month and many cones had opened on the trees and shed their seed. It had been intended to relate seed yield to stocking density and area but this was now impossible. An excellent opportunity to obtain some realistic data on seed yields has thus been lost for another year. Cone collection by climbing should be carried out in July, August and perhaps early September but the first two months are the best. This operation is of course a function of management and once we have demonstrated its practical value and technique involved the local divisional administration should take over the work. It is essentially a piece work operation and we have enough information now to be able to suggest an initial price per bushel of cones. The following data has been obtained by climbing selected trees on which cones had not opened and had not been interfered with by cockatoos. However this latter requirement was difficult to administer and once a tree was climbed the cones were collected anyway and a count made of those removed by birds.

1. YIELDS.

44 trees were climbed
663 cones were collected
86 cones were destroyed by cockatoos
16 cones had opened and shed

Total number of cones produced by 44 trees	=	765
Mean number of cones per tree	=	17.4
Volume of cones collected approx.	=	6.33 bushels
No of cones per bushel	=	~~111~~ 105
Total climbing time for 2 men	=	100 mins.

(The above did not include time for picking up and bagging cones.)

The seed will be extracted from the 663 cones collected and the data obtained added to this report.

Although it was not possible to obtain any area or tree density yield figures it was quite noticeable that the greatest number of cones are borne by the widely spaced trees.

These trees are quite easy to climb and all that is required is a light 10' ladder to facilitate reaching the branches.

The cones are easily removable by hand but leather gloves are a necessity.

..../2

Trees grown at the higher densities are generally impossible to climb, they are too spindly, the branches are small and weak and the cones cannot be reached. This would apply to all densities above about 300 - 400 trees per acre at this age.
(year)

This report should be read in conjunction with my reports of the 25th and 27th of May last.

SR. FORESTER

COMO
27.10.66
DHP:RHS

PINUS PINASTER - CONE & SEED PRODUCTION

The following information has been obtained from Compt. 72, Lane-Poole block - Gnangara.

One man and a boy were able to collect from the ground, where they had been dropped by cockatoos:-

6 Bushels of Cones.

Time 2 hours = 20 minutes per bushel.

This included measuring, bagging and loading into a utility.

Only those cones which were full of sap and heavy were picked up. Any which were light in weight and pale coloured were rejected. Such cones would have been dropped from the trees when very green and immature, and the further development of the seeds permanently arrested.

It is intended to store these cones under cover until October or November of 1966. They will then be dried and the seed extracted to obtain details of seed yield per cone and per bushel of cones.

D.H. PERRY
SR. FORESTER

COMO
DHP:RHS
27.5.66

PINUS PINASTER. CONE & SEED PRODUCTION.

The following data has been obtained from Compartment 72. Lane-Poole Block - Gnangara. Planted in 1941 and now 25 years old. Leiria race stand and Serial No. of original seed is No.371.

Following considerable activity by Black Cockatoos a total of 907 cones (damaged and undamaged) were collected under an unthinned stand of one acre. Further cones remain on the trees. Of these dropped cones 182 were undamaged and represent the possible number we could expect to collect following raids by cockatoos.

If total seed production per acre for this class of plantation is based on 907 cones per acre and the viable seeds per cone as 100 then:-

1 acre will produce 90,700 seeds.

100 acre will yield 9,070,000 seeds.

Estimating 500 plants per 1000 seeds sown then 100 acres of plus stand could yield sufficient seed to produce 4,035,000 plants which would plant 4,500 acres of new plantation at a spacing of 7' x 7'.

Tests showed that there are 107 of the above cones per bushel measure.

Using the figure of 100 seeds per cone then a bushel of cones will produce 10,700 seeds or 1¼lbs of seed approx.

There is little doubt that the above cone production figures can be greatly boosted by thinning and managing the stand for seed production.

D.H. PERRY

DR. HOPKINS
Some preliminary details.

COMO
DHP:RHS
25.5.66

DR. HOPKINS

Development of Conifer Seed, Drying, Cleaning & Storage Facilities at Como.

It is recommended that consideration should be given to the provision within the near future of adequate conifer seed drying, cleaning and storage facilities.

It has been recognised in principal that reliance on overseas supplies is not satisfactory for a number of reasons. These are chiefly the unsatisfactory genetic entity of the seeds supplied and the possibility of interruption of supplies due to war and political unrest.

To eliminate these problems the Department has already established a breeding station and clonal seed orchards of Pinus pinaster and Pinus radiata. These will be yielding seed in quantity from 1967 onwards. To supplement this seed it is proposed to collect cones from a superior stand of Leirian Pinus pinaster in the Lane-Poole Block at Gnangara.

In order to provide for the drying and cleaning of this seed it is recommended that the necessary facilities be installed near the Como Research Station. This position is centrally situated, the necessary ground is available, and the work could be ~~landed~~ HANDLED by available staff. This would also include the testing stratifaction, packing and despatch. Having taken steps to ensure that the genetic quality of our conifer seed is the best we can get it is important that the drying and extraction, cleaning and storage should be under the control of competent staff. This could be ensured at Como.

In order to take advantage of good seed years and to ensure that seed is always available to meet Departmental plantation establishment at least two years requirements should be carried after the current seasons seed has been despatched. To do this

cont/d....

efficiently it is desirable to store the seed at a temperature of 32° to 40° Fah. and at a moisture content of between 6% and 8%. The moisture requirement can be met by drying the seed and storing it in sealed metal or plastic containers. The cold storage would require the building of a refrigerated store.

Plant, Building and Equipment Required.

1. A piece of land approx. 3.00 x 3.00 chains square close to water and electric current. Land to be surrounded by a 6' high cyclone wire mesh fence.
2. An area of about 3.00 chains x 1.50 chains to be excavated and filled with limestone rubble and surfaced with bitumen. This should be strong enough to carry the weight of a truck of cones and should be surrounded by a brick wall 12" high on three sides. This would constitute the drying area. Subdivisions to isolate ~~cover~~ CONE lots could be made with planks fitted with 90° angle brackets to hold them upright.
3. A seed cleaning room housing the winnowing and cleaning machine. This should be approx. 30' x 15' with a concrete floor. It is proposed to build the winnower into the room, to details brought back from Portugal. See sketch attached.
4. A cold store large enough to hold three years supply of conifer seeds with some extension to house weighing, packing and despatch of seeds.

Initially the essential items required are the fenced area, the drying apron and the seed cleaning room and winnower. The latter machine could be built in our own workshops.

Initial Action

It is recommended that a start be made with the construction of the fence, the cone drying apron, the winnower, and seed cleaning room in the financial year 1966-67.

The provision of the cold store could be considered in the following year.

cont/d.....

If approval is given in principle to the construction of these facilities an attempt will be made to estimate the cost.

D.H. PERRY
SENIOR FORESTER

Como
18.1.66
DHP:RHS