

A report for the Forest Growers Levy Trust Project

The extent of NZ poplar plantations, silviculture, marketing and local use of poplar timber.

Establishment of a Poplar Action Group within NZ Farm Forestry Association (NZFFA)

‘Stage one of a three stage review and analysis of the potential of poplars as commercial timber species in New Zealand.’

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Executive Summary

We report findings from two surveys sent to NZ Farm Forestry Association members (and others referred to us) to collect information on poplar growth, silviculture, harvesting, wood processing, and usage.

We report on the formation of a new interest group within NZFFA, the Poplar Action Group and provide information on its purpose and mode of operation.

Lastly we draw attention to recent research on ‘Kawa’ poplar timber, and identify new directions for research to support management of poplar for timber production and commercial use of poplar timber in New Zealand.

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THE EXTENT OF NZ POPLAR PLANTATIONS, SILVICULTURE, AND TIMBER USE

Data Gathering

NZFFA Poplar Surveys 2023

1. A questionnaire, referred to as Survey One below, was developed and distributed by e-mail to NZFFA members and others in mid-February 2023 (Appendix 1).
2. An on-line survey, Survey Two was compiled, and responders to Survey One were asked by e-mail to complete Survey Two in early March 2023. Survey Two focussed on gathering information about experiences of milling and using poplar timber and wood products (Appendix 2).

Survey Responses and Analyses

All NZFFA members were sent a copy of Survey One which sought responses from members who had grown or were growing poplars for timber or contemplating harvesting existing stands of poplar, i.e., wide spaced conservation planting, shelterbelts plantations; or expressed interest in joining a NZFFA Poplar Special Interest Group.

- 87 responses were received of which 86 were growers or had been growers of poplars.
- Of these
 - a. 48% were intending to harvest or had harvested poplars for timber,
 - b. 42% were intending to harvest or had harvested space planted poplars,
 - c. 3% knew non-NZFFA members growing poplars for timber. We followed up by sending a questionnaire to these non NZFFA members and received some comments but no completed questionnaires,
 - d. 25% (22 people) had milled, traded, or used poplar timber,
 - e. 81% (70 people) were interested in being members of a Poplar Action Group and of those interested in joining a Poplar Action Group, 74% were planning to harvest or had harvested their poplar. All of these were advised of the meeting in Timaru and how to attend or access on Teams video conferencing.

Survey Two was sent to all those in category a. above and we received responses from 32 (= 77%).

Questions covered in Survey Two were:

type of planting, location, annual rainfall, area in ha, tree spacing, year planted, variety(ies) grown, pruning regime, any measurements undertaken during growing period, harvesting and milling/preservation practice, end use of timber and any general comments.

An assemblage of the replies is given below.

- 92% of those responding had plantings based in the North Island,
- Rainfall ranged from 700 mm - 2,000mm per annum,

- The total area of poplar solely as space planting was 368ha (but included willows in some cases), as solely plantation planting was 21 ha while 245ha was of a mix of plantation and space planting.
- Three respondents stood out (identified in the questionnaires but not in this report) – Owner A with 318ha (of poplars and willows), all space planted, Owner B with 200ha of mixed planting and Owner C with 50ha of mixed plantings.
- Kawa was the main variety planted in plantations but there was a wide range of varieties,
- Few respondents had done any pruning.
- Only two groups of plantings were measured on a regular basis (Plant & Food Research on their trial blocks, Taranaki RC as a component of their plot assessments). Any measuring done by other Regional Councils was not captured in Survey Two.
- Five respondents provided the age of trees at time of harvest (being 18, 20, 22, 30 and 50 years),
- Six of the eight giving milling details advised a portable mill on the farm was used,
- Only one respondent provided timber yield data being 50 m³ approx. of timber produced at a milling cost of \$2500 approx. This was from 2ha of wide spaced shelter planting harvested at 18 years of age.
- Treatment varied: oiled, stained, H3 and H4 treated.
- Some general comments are listed below.
 - Great timber, logs exported – same price as pine,
 - Well pruned trees produce great timber,
 - The trees have been good as shelter and steep country soil stabilizers, but I believe there are new varieties / species available that perform better on this type of pumice country,
 - Posts and rails stronger than pine and cheaper,
 - I see poplar timber as a potential use for the big “old man” poplars on farm,
 - Easy to grow, beautiful timber under-utilized in NZ. Hard to control re-growth from pruned branches, less of a problem in plantations,
 - Would like to see a veneer market developed in NZ from our pruned Poplar,
 - I am planning on planting more wide spaced poplar as an agroforestry system,
 - Poplar will be used as ceiling panels - trees milled nicely, usually quite straight, milled to 130 x 55mm and fillet stacked in drying shed, will be split twice on bandsaw to 130 x 16mm to be machined to 110 x 13mm panelling,
 - I was advised to spray bleach on the timber when it came off the mill, to avoid the borer, poplar needs to be harvested when there is no sap flow, which means when the leaves are gone, otherwise there is a higher amount of sugar in the timber- if a pond is available, it is helpful to put the logs in the pond, so that the sugars are leached out and replaced with tannin;
 - I used wands previously which grew successfully but I have rooted stock for this coming planting season,
 - these were planted to produce close grain for either 'peeler logs' or wooden sandal soles,
 - Nil value, nil harvestable. Prone to possum and wind damage and very slow growth in radiata block,
 - Harvesting space planted poplars was successful, but big logs, milled & exported same price as pine but head material/slash left I had to burn.
 - The significant size and difficulty of harvesting space planted poplars is a problem, damage to the ground by equipment was an issue,

- We own a permanent production forest, so all our harvesting is single tree or small coupe extraction. Wide spaced poplars are the easiest because there is less issue with trees getting 'hung' and because it tends to be on flatter ground. Most of our wide spaced poplars have not been harvested because they are still putting on diameter increments, and I've decided to leave them to get bigger. We can mill up to 1500mm diameter. Where we have felled poplar trees in among other species the poplars can cause damage because of large heads but this is also true for macrocarpas and blackwoods (our other main species). One good characteristic is the relatively quick time for the slash to degrade if it is in ground contact.
- The advantage to form pruning, even if we don't get timber at the end is reducing sail area and hopefully decrease splitting damage in the future. Older trees that have not been pruned are now splitting badly. We are in the process of putting the poplars/willows into the ETS. Have had approximately 260ha accepted.

Summary

Key findings from Surveys One and Two are bulleted below.

- There is considerable interest in poplar cultivation and utilisation within the membership of NZ Farm Forestry Association
- Using surveys and the NZ Farm Forestry Association (NZFFA) database we have been able to collect and collate particularly useful information on poplar cultivation, harvesting, milling and usage.
- The sample size is small, and the information is incomplete, in that it does not include information from poplar growers who are not on the NZFFA database or known by someone on the database.
- Information is qualitative rather than quantitative. Few landowners reported any measurement data, or knowledge of the poplar cultivars they had on their property.
- There are many landowners who are growing spaced poplars on their properties for soil stabilisation, shade, shelter, and other purposes whose information has not been captured.
- The data collected suggest that little poplar is grown in plantations, with the majority grown as wide-spaced trees on pastoral land or in shelterbelts.
- Silviculture is minimal as is harvesting for timber and other wood products. However, the survey showed that 10 individual landowners have felled, milled, and used their farm-grown poplar and are very satisfied with the performance of the milled product.
- Uses of poplar identified were decks around homes, truck decks, outdoor and indoor furniture, ceiling timbers, fence posts, fence battens, rails in stock yards (see photos below), specialty uses e.g., mallet heads for indoor polo sticks, wooden toys.



Photos. Poplar logs for export; poplar post, angle and battens, interior ceiling of farm-milled poplar, deck and outdoor table constructed from dressed farm-milled poplar. Poplar cultivars unknown (probably Italian hybrid poplar clones).

- Poplar logs were reported to have been exported at a price competitive with radiata pine.
- Some landowners with areas of spaced poplars have put them into the Emissions Trading Scheme.
- Issues arising from harvesting poplar were like that from harvesting other tree species, e.g., slash.
- Little information surfaced about timber treatment, drying or processing.

The Poplar Action Group (PAG, see below) will add to the database of poplar growers and distribute shared knowledge to the resulting network. There is an optimism about the future of poplar as a timber tree, but much more education about silviculture and potential uses is needed if this is to be realised.

Data on plantation poplar grown on public land, notably river berms in Canterbury, were not included in this report. A collation of data on poplar grown on public land is a separate task and would be an important addition to the information sourced during this project.

The Regional Councils River managers group formed a Special Interest Group (SIG) three years ago to develop a poplar wood value chain to utilise a substantial river berm poplar resource, notably in Canterbury. There has been interaction between this group and members of NZFFA PAG. A report prepared for the River Managers group highlighted two urgent action points:

- quantify by location the planted inventory of poplar in New Zealand, and
- help form dedicated poplar process units for both laminated and solid timber.

It is expected that the Poplar Action Group and SIG will share learnings and cooperate in other ways to advance poplar as a valued national timber resource.

The number of poplar and willow poles planted annually exceeds 150,000, with annual 3 m pole sales from Regional Councils to landowners being ~100,000. At a planting density of 50-100 poles/ha, between 1000 and 2000 ha are being planted annually. The data included in this report capture very little of the total numbers and area of poplar being grown on private land in New Zealand, nor that total numbers being planted on public land along river berms, hence we describe it as qualitative.

The NZFFA Poplar Action Group and the New Zealand Poplar & Willow Research Trust will be important extension providers in poplar silviculture in future, as will Regional Councils.

ESTABLISHMENT OF A POPLAR ACTION GROUP (PAG) WITHIN NZ FARM FORESTRY ASSOCIATION (NZFFA)

A Poplar Action Group of the NZ Farm Forestry Association was successfully launched on 30 March 2023, at the NZFFA Annual Conference held in Timaru. Thirty-nine people (including 3 on-line) attended the launch meeting and confirmed their desire to form the PAG. A mailing list of 91 people has been compiled.

Ten attendees offered their services as committee members and the committee met on 24 April on-line. The second meeting is scheduled for 28 June 2023.

Terms of Reference (TOR) for the PAG were proposed at the first meeting in draft form and were circulated to the committee for further comment.

The following purpose and aims were accepted by the committee.

Purpose

Promoting and supporting the growing, processing and marketing of poplar wood and poplar and willow for extractives, fibre and bioenergy

Aims

- 1. Identify and complete the requirements for acceptance of poplar within the NZ Building Code for outdoor building purposes*
- 2. Encourage research into use of poplar and willow to produce a diverse range of products*
- 3. Encourage planting and commercial management of poplar for timber, and poplar and willow, as plantations, shelter belts and space planted trees*
- 4. Establish a business case for producing timber and other products with a special focus on high value end products from plantations, shelter belts and space planted trees on a commercial scale in NZ.*
- 5. Form information networks for growers, harvesters, millers, and clients of poplar wood.*

The current TOR is presented as Appendix 3.

A copy of the 24 April meeting minutes is provided in Appendix 4.

The committee also accepted a work plan, some of which is already underway (see Appendix 4).

ASSESSMENT OF 'KAWA' HYBRID POPLAR TIMBER FROM NORTHLAND, NEW ZEALAND

Complementary to our collation of information, the Northland Regional Council, with support from the MPI Hill Country Erosion fund, recently published research on Northland grown Kawa poplar which demonstrated that it holds promise for structural applications.

Research assessing treated 'Kawa' poplar timber for external and internal use was carried out by Dean Satchell, Northland Regional Council, and his draft research report was released in February 2023.

It can be found using the URL below.

<https://www.nzffa.org.nz/farm-forestry-model/resource-centre/reports/reports-by-species/poplar/kawa-poplar-timber---properties-and-market-opportunities/>

The research reports in detail the methodology in selecting the trees, milling the logs, treating the timber, and using it in construction (see photos).



Photos: External view of cabin constructed from thermally treated 'Kawa' poplar; view of interior 'Kawa' poplar ceiling of the cabin.

The research reported that stiffness and strength testing of solid timber Kawa demonstrated good strength, and Boron diffusion to the H1.2 hazard class used for interior structural applications was achieved without difficulty. Glulam tests were also good.

FUTURE RESEARCH

The PAG has identified future research in its work plan.

1 A national map matching poplar cultivars to regions and sites

NZPWRT has national trials of a range of commercial and novel cultivars and can recommend poplar cultivars most suitable for specific regions and sites.

2 Further evaluation of poplar timber

Evaluate Kawa poplar from other regions and evaluate other poplar cultivars to see whether timber characteristics are consistent throughout the country and across cultivars.

3 Growth data for plantation and spaced poplar

Identify permanent sample plots (PSP) and collect height and diameter data on a regular basis. NZPWRT and Scion may have suitable poplar trials for this use. Most trials are on private land.

4 Poplar Plantations

Conduct a more extensive survey through other channels to collect information on areas planted in poplar on private and public land with potential for use as a timber resource and make this data available for developing a viable commercial poplar timber industry.

The PAG will seek Central Government and industry funding support for these initiatives.

APPENDIX 1 SURVEY ONE



THE NEW ZEALAND POPLAR & WILLOW RESEARCH TRUST

Questionnaire to all NZFFA members – please respond by Wednesday 22nd February.

The NZ Poplar and Willow Research Trust is preparing a report on practices for growing, managing, harvesting, and marketing poplar timber, with the goal of advancing the commercial viability of a large-scale poplar timber industry in NZ.

To assist in this, we seek to identify the parties involved and hopefully bring them together into a Poplar Action Group.

Our project team is

- Vaughan Kearns and Tim Forde, NZFFA Executive members
- Ian McIvor and Allan Frazer, NZ Poplar and Willow Research Trust.

We would ask any NZFFA member who is interested in the outcome of this project to complete the short questionnaire below by circling Y or N and forward the results to Allan Frazer allan.frazer@gmail.com desirably no later than 22 February.

We are interested in poplar plantations and space plantings.

1. Are you growing poplar with the intention of harvesting it for timber, or have you in the past? Y N

2. Have you ever harvested space planted poplar trees for timber, or are you planning to? Y N

3. Do you know of anyone else involved in growing poplars for timber? Y N

4. Do you mill, market, or use poplar timber? Y N

5. Are you interested in joining a special interest poplar timber group within NZFFA? Y N

If you have answered yes to any of the above questions, please return this form to us before 22nd February. We will then send you a more detailed questionnaire to learn more about your experience and interest.

Name

Email

Phone

Thank you for your assistance.

Regards

Allan Frazer
Business Manager NZPWRT

APPENDIX 2 SURVEY TWO

FOLLOW-UP QUESTIONNAIRE TO PEOPLE WHO ARE GROWING POPLAR WITH THE INTENTION OF HARVESTING FOR TIMBER

Thank you for your response to our previous questionnaire.

We would like to learn more about your experience growing poplar with the intention of harvesting for timber and would appreciate your answering the following Questionnaire.

Please reply to allan.frazer@gmail.com by no later than Friday 17 March

LOCALITY, SIZE AND MANAGEMENT OF POPLAR TIMBER RESOURCE

1. Please state the type of poplar timber resource; i.e., a plantation, shelterbelt or wide-spaced soil conservation planting -----

2. Where is the locality of your poplar timber resource? -----3.

What is the annual rainfall? -----

4. What is the area of your timber planting in ha? -----

5. what is the tree spacing? -----

6. What year were the trees planted? -----

7. What poplar variety(ies) are you growing? -----

8. What pruning regime has been/will be undertaken? -----

9. What diameter and height measurements (yield assessment) have been undertaken over time (measurements, tree age) -----

HARVESTING AND PROCESSING POPLAR

If harvesting has taken place, please advise:

10. Tree age -----

11. Method of felling and milling _____

12. Volume of usable timber produced by type along with cost of harvesting and separately milling -
if sold standing please advise the \$ return. -----

13. Method of preserving (treating) if undertaken and cost. -----

14. Poplar timber used on the farm:

(a) What was it used for? -----

(b) What were the \$\$ benefits compared with purchasing the same material commercially? -----

15. Poplar timber sold from the farm:

(a) What was the timber used for? -----

(b) What were your farm gate returns from the sale of timber? -----

16. If you have harvested wide space planted poplars please advise your experience. -----

GENERAL

17. Any other comments on growing/harvesting poplar for timber. -----

CONNECTING TO A POPLAR GROWERS NETWORK

18. Would you be interested in becoming a member of a new Action Group specifically for poplar timber under the umbrella of NZFFA? -----

HOW CAN WE CONTACT YOU?

Name -----

E-mail -----

Phone No. -----

APPENDIX 3

Poplar Action Group (PAG) Terms of Reference

Purpose

Promoting and supporting the growing, processing and marketing of poplar wood and poplar and willow for extractives, fibre and bioenergy

Aims

- 1. Identify and complete the requirements for acceptance of poplar within the NZ Building Code for outdoor building purposes**
- 2. Encourage research into use of poplar and willow to produce a diverse range of products**
- 3. Encourage planting and commercial management of poplar for timber, and poplar and willow, as plantations, shelter belts and space planted trees**
- 4. Establish a business case for producing timber and other products with a special focus on high value end products from plantations, shelter belts and space planted trees on a commercial scale in NZ.**
- 5. Form information networks for growers, harvesters, millers, and clients of poplar wood.**

Objectives

- Establish membership fees and organise financial management of Poplar Action Group
- Develop a Strategy and Annual Plans
- Release regular communications
- Recruit new members
- Work with other NZFFA Action Groups for mutual benefit
- Promote the merits of poplar to industry, government and the general public as a valuable resource in the NZ economy

Membership Catchment

- Growers of plantation and space planted poplar likely to be used for timber production
- Harvesters of poplar
- Millers of poplar
- Marketers/exporters of poplar logs and timber products
- Timber organisations
- Researchers
- Importers of poplar wood

To become a member of the Poplar Action Group, an applicant must first join NZFFA (<https://www.nzffa.org.nz/become-a-member/>) and then pay an additional \$30 to join the PAG.

APPENDIX 4

Minutes of the first meeting of Poplar Action Committee 24 April 2023 (held as a Teams video call)

| item | Action | Who |
|--|--|-----|
| Attendance –Eric Appleton, Stan Braaksma, Tim Forde, Allan Frazer, Vaughan Kearns, Ian Mclvor, Kees Weytmans | | |
| Committee membership – those nominated were Eric Appleton, Stan Braaksma, Tim Forde, Paul Frater, Allan Frazer, John Gordon, Vaughan Kearns, Ian Mclvor, Dean Satchell, Kees Weytmans | Confirmed and to be advised to members | AF |
| Committee appointments – Chairman Ian Mclvor, Secretary/Newsletter editor Allan Frazer, Treasurer Kees Weytmans | Confirmed and to be advised to members | AF |
| Banking – Proposed to set up an account with Kiwibank. Proposed that Kees and Allan will be signatories | Confirmed | AF |
| Group name – proposed to retain “The Poplar Action Group” noting that, as appropriate, objectives and actions would also include willow. | Confirmed and to be advised to members | |
| <p>Objectives – The pre-circulated TOR paper containing suggested Objectives was discussed and some amendments were made as follows:</p> <p>Original</p> <ol style="list-style-type: none"> 1. Investigate selections of poplar for yield including expanding the existing Trial Plots (PSPs), colour and stiffness/strength, and saleable timber; record how those qualities vary across location and cultivar; and assess in detail the uses of the timber. 2. Encourage research into the opportunities for the production and use of poplar wood and poplar and willow fibre, chemical and bio-energy products of these species. 3. Promote those values to encourage the wider planting and commercial management of these species. 4. Establish a business case for producing timber and high value end products from plantation and wide spaced poplar on a commercial scale in NZ. | The revised Objectives are to be circulated for approval and once agreed will be provisionally accepted subject to review following development of an agreed Work Plan | All |

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| <p>5. From this, seek to provide strong regional employment and income diversification across at least three regions within 25 years.</p> <p>Revised</p> <ol style="list-style-type: none"> 1. Undertake site specific investigations into the selection of poplar of different cultivars for colour and stiffness/strength and growth rates, yield, and suitability for favourable milling qualities. <ol style="list-style-type: none"> a. Utilise the knowledge gained to have timber from poplar, subject to either chemical or thermal modification, accepted within the NZ Building Code for outdoor building purposes. b. Report examples and review performance of poplar use in building and construction. 2. Encourage research into the use of poplar and willow for products based on fibre, chemical and bio energy characteristics 3. Promote the wider planting and commercial management of poplar for timber, and poplar and willow for fibre, chemical and bio energy production, as plantations, shelter belts and space planted trees 4. Develop a business case for producing timber and other products with a special focus on high value end products from plantations, shelter belts and space planted trees on a commercial scale in NZ | | |
| <p>Work Plan – The following items 1-4 were proposed, and need to be prioritised:</p> | | |
| <p>1. Produce a Newsletter for distribution at the June National Field Days Exhibit Stand</p> <p>Vaughan said he had ordered paper copies of the MPI booklet titled “Growing Alternate Exotic Species for Forestry” to hand out at Field Days.</p> | <p>Vaughan to send AF copies of S Otago and Waikato branch newsletters as examples to follow.</p> | <p>VK</p> |
| <p>2. Expanding membership – All to advise of any non- NZFFA members who were prospective members. Vaughan has a Federated Farmers contact that he will approach for assistance.</p> | <p>AF to advise Vaughan of action already taken with Fed Farmers</p> | <p>AF</p> |
| <p>3. Building Code acceptance – seek to have timber from poplar hybrids, subjected to either chemical or thermal modification, accepted within the NZ Building Code for outdoor building purposes.</p> | <p>AF to discuss with Dean</p> | <p>DS?</p> |

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| <p>Dean is actively involved and will hopefully be able to take a lead on this. Support application for funds in the FGLT round closing on 31 August.</p> | | |
| <p>4. Undertake site specific investigations into the selection of poplar of different cultivars for colour and stiffness/strength and growth rates, yield, and suitability for favourable milling qualities -</p> <p><u>* Locate existing and expanding Permanent Sample Plots (PSPs) for Poplars is an important component of this.</u></p> <p>Kees advised that SCION have prepared a report on testing Veronese and Kawa trees for growth and wood properties, including poplars on his property.</p> <p>Potential new sites for PSPs noted were Overill Forest Partnership in Wairarapa, Neil Cullen’s former plantation in South Otago, Whatutu, “Bill’s” block, Kees Weytman’s block, Northland sites known to Vaughan, NZPWRT trial block at Taihape, possibly Castlepoint Station, Landcorp. NZFFA has funding to assist which expires 31 December 2023. Eric noted that there will need to be some change to the criteria used for PSPs as these apply currently to dense stands of radiata. Existing SCION listed sites need further efforts to locate owners. Support application for funds to the Forestry and Wood Processing Industry Transformation Plan (ITP) with the possibility of Stan and Eric doing this work.</p> <p><u>* Seek more information from Survey participants who have harvested and/or milled and/or marketed poplar for timber in some volume. Contact those planning to do so in future for information on growth rates, milling qualities and end uses.</u> Local NZFFA branches may also be able to assist. In addition, NZPWRT will post a request on their website, Facebook, and LinkedIn pages. A list of questions needs to be written to be used in a one-on-one conversation.</p> <p><u>* Establish how representative timber cultivar samples can be obtained for colour stiffness and strength testing</u></p> | <p>Need to get the SCION report.</p> <p>Get plots established including arranging funding.</p> <p>Draft questions to be prepared</p> <p>Determine approach</p> | <p>KW</p> <p>KW, VK</p> <p>TF, AF</p> <p>TF, VK</p> |
| <p>Terms of Reference (TOR) – We revised the Terms of Reference to accommodate items 1- 4 above.</p> | <p>Circulate to Committee members for approval</p> | <p>AF</p> |
| <p>Other</p> <p>1. Northland Regional Council reported on tree uprooting during Cyclone Gabrielle. Mature Kawa poplar were examples. Members living in other regions affected by the cyclone did not experience</p> | <p>Ask Dean if he is happy to copy the report to all committee members</p> | <p>AF to ask Dean</p> |

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| <p>this effect. There may be a need to review more widely to identify any new research needs.</p> <ol style="list-style-type: none"> 2. Noted that INCA, the investment entity for IKEA, have been in NZ recently and have acquired land for timber production and are considering plantation forestry. Both Kees and Stan are aware of this initiative. 3. Vaughan asked if it would be OK for the NZFFA website to post links to appropriate NZPWRT website material – Ian agreed. 4. We agreed a future action to investigate optimal ways for growing trees for timber with stock grazing below considering variables such as tree spacing and age of harvesting | | VK |
| <p>Next Meeting – Wednesday 28th June at 1pm to 3pm</p> | | |