Evolution and adaptation of Spanish Bush cherry growing system in Australia and some options for intensive plantings

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Introduction

There has been a significant worldwide revival in cherry production due to general orchard diversification and the emergence of some promising new varieties and rootstocks.

Although traditional low density orchards with large open centre trees still dominate the commercial scene in many countries, cherry growers in Europe, North America and Australia are adopting more intensive 'pedestrian' style systems.

A number of factors are influencing these changes and growers attitudes -

- Vigour controlling rootstocks
- High quality, productive and some relatively rain tolerant cultivars
- Need for efficiency in manual orchard operations – pruning and harvest. Manual labour in cherry production accounts for 75% of variable costs
- Improved early production and fruit quality
- Better harvest management and reduced fruit damage
- It is cheaper and more practical to construct bird netting and rain cover structures over 'pedestrian' orchard canopies.

Many medium to high density production systems are available to cherry growers. They usually fit Multi Leader Bush, Centre Leader and planar 'V' canopies. Regardless of the system, correct choice of tree density, rootstock, variety, level of pruning and tree quality play a key role in the success of new plantings.

A number of growing methods are discussed in this paper.

Steep Leader

- This type of tree is used in North America for low density orchards on strong stocks and 5.5-7 m x 4.5-6 m (238-404 trees/ha) spacing.
- Dwarfing stocks allow some improvement in tree spacing.

- Severe heading cuts are used to develop a permanent tree structure which includes three to four vertical leaders and a similar number of horizontal limbs located at the tree base.
- The framework forms a 'pyramid' shape canopy which contributes to good light distribution.
- Stub cuts are regularly used to renew fruiting laterals arising from the main limbs
- Heavy pruning – heading cuts during the tree development delay fruiting.

'Original' Spanish Bush

- A 'pedestrian' orchard canopy, quite easy to develop and maintain.
- High variety/stock vigour is diluted by a large number of growing points – moderate size limbs.
- Compared with traditional systems it offers considerable reduction in labour costs for pruning and harvesting.
- Heavy pruning (severe limb heading) during the first two to three years of tree development has a negative effect on early yields.
- Spanish Bush concept -
  - Tree spacing: 5-6m x 2.5-3m (555-800 trees/ha)
  - Maximum tree height: 2.5m
  - Free standing trees
  - Rootstocks: Gisela 6 on deep fertile soils Mazzard and P. Mahaleb.
- Spanish Bush development -

Year 1 - Plant single stem unbranched nursery tree
- At bud break head tree at 30-80cm above ground.
- Spread new shoots with toothpicks and clothes pegs to develop wide crotch angles
- Provide optimum conditions for strong tree growth(irrigation, nutrition, weed control)
- When primary branches reach 50-60cm in length prune them back to 15cm.
- Cut all branches at the same height for uniform regrowth.
- Under good growing conditions, at the end of first growing season, secondary branches should be 50-60cm long.
- On both sides of the tree line at the ground level install two parallel wires which are kept in place for one growing season.
- Tie down to the wires all fully developed secondary branches to open the tree framework. Limb spreading is particularly important for upright Lapins type varieties.

Year 2 - At full bloom prune secondary branches back to 25cm.

- In late spring when tertiary branches reach 60cm in length, leave intact the central and horizontal branches and shorten the remaining new growth to 25cm.
- Horizontal branches will become the first fruiting limbs.
- Centre branches are left in until the start of the fruiting phase to assist in spreading the canopy.
- This is the last tree training – development cut essential for Lapins type varieties on vigorous rootstocks.
- Naturally branching and spreading varieties like Sweetheart on weaker stocks may not require heading of tertiary limbs.
- To improve light distribution thin very strong and upright branches starting with the spring of the second growing season.
- Limb thinning becomes an on-going orchard operation.
- Well positioned secondary and tertiary branches are retained to form permanent scaffolds in fully established orchard canopy.
- All fruiting wood is located on the permanent framework.
- To maintain good fruit size fruiting laterals are regularly renewed over a four year period.
- Wood replacement – stub cuts are normally applied after harvest (summer cut).
- If the tree vigour starts to decline then the dormant season stub cuts are used to promote vigour and fruit size.
- Annual topping at 2.5m and hedging ensure that the Spanish Bush remains a compact pedestrian type hedgerow.

Australian Bush – "Aussie Bush"

- The system has been developed by Bas van den Ende in Victoria.
- The main tree framework consists of a short trunk and four permanent upright leaders which carry wide angle fruiting laterals.
- The space inside the tree structure is kept free of growth to permit good light distribution.
- "Aussie Bush" on Colt rootstock at 888 trees/ha (4.5 x 2.5m) and maximum tree size of 2.4m has produced encouraging early crops.
- The Bush development -
  - Head the tree at 0.5m above ground after planting and select well balanced main limbs in the first year.
  - At early bud break in the second year apply Promalin (BA+GA4+7)/water based paint mixture (1:3 ratio) at the base of main leaders to promote side branches.

- Remove buds immediately below the apical bud
- Use clothes pegs and toothpicks to create wide shoot angles.
- Strong and dominant shoots in the top section of the canopy are controlled by bending and pinching.
- Decrease irrigation towards the end of the growing season to slow down vegetative growth and assist in fruit bud development.
- All side branches must fit the 3:1 rule (main leader/side branch diameter ratio).
- Most of the tree management strategies are also followed during the third growing season.
- Fruiting wood renewal is done with stub cuts.

- "Aussie Bush" is more precocious than the "Steep Leader" and the standard "Spanish Bush" due to minimal pruning and quite detailed limb training.

Kym Green Bush (KGB)

- A variation of the "Original Spanish Bush" adapted and promoted by Kym Green, South Australia.
- Widely used in Australia with varying degree of success.
- KGB objectives -
  - High fruit yield and quality
  - Efficient use of orchard labour. Over 70% of fruit harvest and all pruning can be done without ladders.
  - Simple to develop and manage.
  - "Fast" orchard canopy development.
  - Easy renewal of fruiting wood – limb replacement.
  - Efficient use of sunlight – interception and distribution.
  - Low capital cost and good economic returns.
  - Low tree height for easy construction of bird netting and perhaps rain covers.
- KGB Concept -
  - Tree spacing: 4-4.5m x 2-2.5m (900-1250 trees/ha)
  - Tree height 3-3.5m
  - Free standing trees on Colt and Mazzard F12-1 stocks.
  - Develop around 30 temporary fruiting limbs per tree.
  - No side shoots are retained on the main limbs
- KGB Development -

Year 1 - Plant as early as possible
- Plant multi leader nursery tree
- At bud swell cut back all limbs to 15cm

- Keep the top of tree level to encourage uniform limb regrowth
- This is a growth stimulating cut
- Ten weeks after full bloom or when new growth reaches 60cm cut back all branches to 15cm
- This is a "green cut" or the "Spanish cut", a devigorating cut
- Must create good conditions for strong growth – irrigation, nutrition, weed control and pest and disease management
- Vigorous spring-summer shoot growth is possible in hot climates and on deep fertile soils
- The "Spanish cut" cannot be successfully used in Tasmania due to shallow topsoil and cool climate.

Year 2
- At bud swell cut back all limbs to 15cm
- Keep the top of tree level for uniform regrowth
- Ten weeks after full bloom or when new growth reaches 60cm cut back all except centre limbs to 15cm ("Spanish cut")
- Limbs in the centre of the tree are left in to assist in spreading the canopy. This will create a more open-spreading tree form.

Year 3
- At this stage, under good growing conditions, the bush should have 25-30 vertical limbs
- Remove crowding limbs from the tree centre
- There is no provision for side shoots on the main KGB framework
- In early spring cut off all side shoots and single tops of main limbs
- Tip the remaining terminal shoot by 1/3 to avoid fruit bunching
- Select the largest diameter limb in each quarter of the tree and cut back to 15cm
- This is the start of limb rotation-renewal. Large dominant limbs are converted into weaker more fruitful limbs.

Year 4 and future years:
- Cut back strong dominant limbs to 15cm
- Remove thin spent fruiting wood
- Aim to rotate all fruiting limbs over five to six year period
- Remove unfruitful limbs in spring
- In very productive varieties (Lapins, Simone, Sweetheart) tip new growth by 1/3 shoot length at full bloom to avoid fruit bunching. This is referred to as shoot "declumping" operation
- Keep the canopy open for good light distribution
- Mature trees should end up with 18-20 limbs.

"Intensive Spanish Bush" (ISB)

- Under test at Grove Research Station, Tasmania and some commercial plantings.
- In cool climate and on weak soils in Tasmania the rate of annual growth is not sufficient to benefit from the "Spanish-green cut".
- Many growers continue to prune back annual growth by using the dormant cut in order to achieve the 25-30 limbs per tree target.
- Excessive pruning and low tree densities delay commercial yields to years five and six.
- ISB combines stock/soil moderate vigour with advanced multi leader nursery trees, medium level pruning and high tree density to improve orchard precocity.
- ISB approach -
  - Tree spacing: 4-4.5m x 1-1.5m (1666-2500 trees/ha)
  - Tree height: 2.5 – 3m
  - Free standing trees
  - Rootstocks: Colt and Mazzard F12-1
  - Develop around 12-15 limbs per tree
  - Relatively low capital cost
  - Simple to develop and manage
  - 'Pedestrian' – low tree structure orchard suitable for bird netting and rain covers
- ISB Development -

  Nursery phase - produce advanced two year old benchgrafted multi leader trees.
  - Benchgraft large size stocks with matching size four to five bud scion
  - Plant benchgrafted stocks early in nursery position
  - Leave all shoots in place – do not single
  - At the end of year 1 cut back new growth to 15cm
  - At the end of year 2 in the nursery the benchgrafted trees should have six to nine well developed primary shoots

  Orchard phase -

  Year 1 - Plant advanced multi leader trees as early as possible
  - At bud swell cut back all limbs to 15cm
  - Keep the top of tree level to facilitate uniform regrowth.

  Year 2 - At this stage the tree should have 12-15 vertical limbs
  - Select 1-3 strongest limbs and cut back to 15cm

- This is the start of minimal limb replacement program
- 10-15 year 3 fruiting limbs per tree are established under this approach
- Remove any crowding limbs from the tree centre
- Cut off all side shoots and single tops on main limbs
- Tip the remaining terminal shoot by 1/3 to prevent fruit bunching in fruitful varieties.

Year 3 and subsequent years:

- Select 1-2 strongest limbs per tree and cut back to 15cm
- Further management of fruiting limbs and new growth as for KGB. Eliminate overcrowding limbs and weak fruiting wood. Single and tip top of limbs. Maintain open tree canopy

In addition to the multi leader bush type trees, intensive systems based on Centre Leader, Tatura and "V" Axe will be featured in the power point presentation.

Literature cited

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