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# The Best Practice Guide for UK Plum Production

## Plum Thinning

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### Flower and fruitlet thinning (abscission) and alternative methods of improving fruitlet growth

#### Introduction

Many cultivars of plum naturally set excessive numbers of fruitlets in relation to tree size and leaf area in a significant proportion of seasons. This can result in strong competition between developing fruitlets for the trees' assimilates and nutrients, resulting in fruits which are small and unmarketable at harvest time, fruits which have reduced quality and perform poorly in postharvest storage, cause branch breakage if crops are very heavy strong competition between the developing fruitlets and the flowers forming for the subsequent season which can lead to reduced numbers and quality of floral buds in the following year, exhaustion of tree reserves, and reduced cold hardiness.

Thinning is important to profitable plum production because a satisfactory price is only received for adequately but not excessively sized fruits to meet supermarket specifications. Knowledge of market specification for size and other attributes is vital. For plum, the fruit size from an orchard depends largely on the total number of fruits/tree. Over and erratic cropping which result in bienniality must be avoided. Achieving consistent yields of correctly sized fruit is of paramount importance. This is done by reducing numbers of flowers and/or fruits where numbers are excessive, a process known as thinning. The challenge is to do this in a reliable and measured way at economic cost. Flower (blossom) thinning can be done mechanically, chemically or by hand. The main problem with flower thinning is that, by definition, it is done before the degree of fruit set is known. There is a danger that frost or poor weather conditions will occur after the flower thinning has been done, rendering the blossom thinning of no benefit, or worst still, highly detrimental. The main mechanical flower thinners used currently in the UK are the Darwin tractor drawn string thinner and the Powercoup hand held string thinner but the Eclairvale tractor drawn mechanical thinner, which uses a non-powered cylindrical brush of long flexible rods to remove blossoms or fruitlets, provides important new opportunities to UK plum growers. In the past the foliar nutrient Ammonium thiosulphate (ATS) has been used as a chemical blossom thinner but differences in the timing of application, weather conditions and rate of application have led to variable results. In general crop yield is not as consistent or reproducible as fruit growers require. Fruitlet thinning is a safer, more reliable method, than blossom thinning but if done by hand has high labour costs. The Eclairvale mechanical thinner (mentioned above) is an important new development that needs to be exploited for fruitlet thinning by UK fruit growers, including for plums. Fruitlet thinning is usually done by hand sometimes including removal of whole branches by pruning. Hand thinning is an added and substantial cost. Some stone fruit growers use repeated rounds of hand fruitlet thinning (quantity then quality thinning) to achieve the optimum crop load but this comes at considerable expense.

For most plum varieties the minimum size specified by supermarkets for class 1 is 40 mm (except those which are recognized as being small fruited (e.g. Opal) where the minimum size for class 1 is 30 mm). Plums outside the size range are likely to be of no value. Remember that if a sample of plums has an average size of 40 mm, then approximately 50% of this sample will be smaller than the minimum 40 mm size threshold and be of no value. An average fruit size greater than the threshold (e.g. 45 mm) needs to be targeted to ensure few fruits are below the 40 mm threshold. Remember also that picking, handling and grading costs for smaller numbers of larger fruits are proportionally lower. However, there is also likely to be an upper size limit for class 1, typically 55 mm diameter.

Fruits that are all in the correct size range specified by the market are:

- Potentially all of market value
- Easier and cheaper to pick
- Cheaper to grade

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Apart from the loss in crop value if thinning is not done when necessary, there are other serious consequences. Branch breakage from excessive crop loads can be very damaging and costly. An orchard may take several seasons to recover, or may be ruined. Branch breakage allows entry for bacterial canker, especially if there is significant rainfall before wounds heal.

This essential crop load adjustment can be achieved using several thinning methods, which are discussed below.

### The variability of fruit set for UK plum varieties

The final numbers of fruits that set on a tree is influenced by many factors. The most important are:

Tree health and vigour  
Blossom abundance  
Blossom strength  
The degree of pollination  
The success of pollen growth and fertilization (initial fruit set)  
Prevailing weather conditions

All the above factors are affected by variety, orchard location, system, age, nutritional status etc. but especially by weather conditions which cannot be predicted reliably in advance. Most plum varieties flower early and there is a significant risk they will be severely affected by frost events when the blossoms are vulnerable before or during flowering. Even if frost does not occur, cold weather, especially during and immediately following flowering when pollination and fruit set occur, can result in poor fruit set.

Ideally thinning methods would be ones based on fruit numbers per unit leaf area or fruit numbers per amount of light intercepted by the tree canopy. Unfortunately, as both of these are difficult to measure quickly, simpler methods of estimation need to be adopted. These may be:

- Thinning to specified numbers of fruits per flower cluster
- Thinning to specified numbers of fruits per tree

### Best Practice to Achieving Optimum Fruit numbers

The optimum cropping levels for particular plum orchards are difficult to estimate, as the optima depend upon tree age, rootstocks, site conditions (soils and climate) and systems of tree management. Nevertheless, it is essential that some estimate is made so that thinning decisions can be appropriate.

#### Thinning decisions should be based on:

- Knowledge of the market specification for the variety(ies) (minimum and maximum size requirements for Class I)
- Accurate assessment of optimum fruit numbers per tree to achieve the potential optimum yield of adequately sized fruits for the orchard
- Accurate assessments of the numbers of flower clusters, flowers per cluster, fruit set (stoning), fruitlet clusters and fruitlets per cluster present per tree in the orchard at the appropriate growth stages
- The current season's weather
- The current health of the tree and balance of shoot growth to flower numbers
- Historical records of under or over cropping

### Optimum fruit numbers needed per tree

Thinning should be based on target numbers of fruits per tree at harvest. These target fruit numbers are adjusted to take account of the tree spacings within the rows or between rows in multi-row beds. The recommended values for Victoria are shown in the table below. The table should be used as a guide to fruit numbers per tree. Better still, the grower should obtain accurate grading records in order to calculate the actual numbers per tree over the last three

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seasons and relate these to optimum yield and fruit size expectations. **IT IS VERY IMPORTANT NOT TO OVERESTIMATE THE YIELD POTENTIAL OF AN ORCHARD WHICH COULD RESULT IN LEAVING TOO MANY FRUITS PER TREE THAT WILL NOT ALL OR MOSTLY SIZE UP TO THE MINIMUM SIZE REQUIRED BY THE MARKET.**

**Table 1. Numbers of fruits per tree to achieve target yields of adequately sized fruits**

Tree density (trees/ha)	Target yield (t/ha)	Number of fruits per tree
		Medium fruited (Victoria) (>30 mm, <55 mm diameter)
3500	10	46
	20	91
	40	183
3000	10	53
	20	107
	40	213
2500	10	64
	20	128
	40	256
2000	10	80
	20	160
	40	320
1500	10	107
	20	213
	40	427
1000	10	160
	20	320
	40	640
500	10	320
	20	640
	40	1280

The above numbers of fruits are those required at the time of harvest. Where tree health and vigour is poor, significant ‘June drop’ of fruits may occur between fruit set and early July, the extent of which is variable and cannot be reliably estimated. However, grower experience indicates that June Drop is usually minimal in healthy, vigorous well managed plum orchards provided with a good post flowering irrigation and nutrition programme.

Modern weight/size grading equipment will provide accurate weights of fruits and, therefore, fruits per kg for each size band. Where these are not available use the figures below as a guide.

**Table 2. Average fruit weight (g) and number of fruits per kg for Victoria, a typical oval shaped fruit variety**

Average fruit diameter (mm)	Oval fruited varieties (e.g. Victoria)	
	Average fruit weight	No. fruits/kg
30	14	70
35	31	32
40	47	21

45	64	16
50	80	13
55	96	10

## Thinning

### The current season's weather

The suitability of the current and forecast weather for bee activity during flowering and flower set is an important factor in deciding whether or not thinning is likely to be beneficial. Thinning may be unwise if the weather is unfavourable and especially if frost has occurred or is likely. Also take into account the effect of a mild winter on flower quality.

### Current health of tree

Experience shows that trees which are less vigorous will set more readily and consistently than vigorous trees. Vigour depends on many factors including scion, rootstock, planting system, water availability, nutrition, soil etc.

### Reducing and optimising crop load (including thinning)

Growers must first decide whether there is a need to thin the plum orchard and then determine which method of thinning is the most appropriate. Three possible broad strategies are available:

- 1) Reducing the number of flower buds in the late dormant season (termed flower bud extinction)
- 2) Flower (blossom) thinning
- 3) Fruitlet thinning

The advantages and disadvantages of these strategies, methods and their snags and difficulties are discussed in turn below.

## FLOWER BUD EXTINCTION

In the late dormant period as flower buds start to swell but before bud burst, the number of flower buds present on a tree can be reduced by rubbing them off by hand, a process termed winter or dormant bud extinction. This cannot be done mechanically or chemically. At this time the flower buds which are roughly spherical are fairly easy to distinguish from vegetative buds which are generally more oval and pointed. The aim is to reduce the number of flower buds to reduce the need for or costs of later fruitlet or fruit thinning. However, dormant bud extinction, like other methods of flower thinning, should only be done in orchards which reliably set an excessive number of fruitlets e.g. heavy cropping varieties in plantations with frost protection. A range of bud extinction approaches are possible:

- Remove a fixed proportion of flower buds. For example half of buds can be removed by rubbing out every other one working along each branch. With this approach there is no attempt to adjust the overall distribution of flower buds on the tree.
- Reduce the bud numbers to a fixed number per branch, distributed in a desired way (e.g. as evenly as possible along the branch). The number of buds per branch can be estimated from the number of branches per tree. An assumption needs to be made that one or two buds is needed for each fruit required to achieve the target yields per tree (see above).
- Bud extinction has a high labour requirement, similar to that for fruitlet or fruit thinning. Critically, it has to be done before the occurrence of future unfavourable weather events such as spring frost or cold conditions during fruit set or early fruitlet development can be known. It could be a useful method on young trees where flower bud numbers are very variable from tree to tree and where available labour is not otherwise deployed on other work.

### Important questions

- Does historical data show consistently that thinning is necessary?
- Are the flower cluster numbers twice as high (or more) than necessary for a good set?
- Is the plantation frost protected?

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- Is pollination likely to be adequate?
- Are adequate labour resources available?

### *Advantages*

Whole fruit buds are removed early

### *Disadvantages*

- Done before fruit set is known. Difficult to judge if it is necessary/worthwhile
- High labour requirement (likely to be uneconomic except on small trees)
- Wounds could become infected with bacterial canker

## FLOWER (BLOSSOM) THINNING

Reducing competition between blossoms and fruits for tree resources can result in better quality flower and increased fruit size. Flower thinning involves the removal of a proportion of the flowers to reduce competition. The aim is to reduce the cost of later fruitlet or fruit thinning which is generally done by hand. Blossom thinning is best done using mechanical or chemical methods currently. Hand thinning of blossoms is too labour intensive and hence too expensive. Blossom thinning can also be done by application of the nutrient Ammonium thiosulphate, which desiccates flower parts and prevents fruit setting. **The main problem with flower thinning is that, by definition, it is done before the degree of fruit set is known. There is a danger that frost or poor weather conditions will occur after the flower thinning has been done, rendering the blossom thinning of no benefit, or worst still, highly detrimental, reducing the crop below the amount desired.**

### *Mechanical flower (blossom) thinning*

#### **Hand held**

Handheld mechanical blossom thinner are portable, string-style devices either with their own (electric) motor or which attach to a cordless drill or to an air or hydraulic power source. A rotating rod holds pliable 'trimmer' cord that rotates to knock blossoms off. They are generally lightweight, effective and causes little or no damage to the tree. A Powercoup PW2 Telescopic Blossom Thinner (Infaco) (available through Agricare of Canterbury ([www.agricareuk.com](http://www.agricareuk.com))) at a price in the region of £1035 + VAT including thinner attachment, motor handle, battery and cable) was successfully used in the recent Innovate UK plum project by NIAB EMR and S W Highwood in 2016-18. Hand held mechanical thinners allow a more targeted thinning approach to suit each individual tree shape and to achieve desired crop loads or strategies than mounted mechanical thinners like the Darwin. They can be used on larger more traditional shaped trees as long as they have been carefully structured and pruned. They could also be used to follow up after a Darwin thinner to carry out targeted thinning. They can be used from the ground or from a platform.

Handheld mechanical blossom thinners can be used from pre-bloom to after petal fall. However, there is a desire to leave the thinning as late as possible, in case frost or poor weather during blossom or early fruit set are likely to have caused inadequate fruit set, negating the need for thinning or making it detrimental. In trials by NIAB EMR and S W Highwood in 2016-18, use of the Powercoup hand held string blossom thinner in a Victoria orchard at various growth stages indicated that it performed with similar effectiveness at different times during blossom up to a week after petal fall, but thereafter it caused damage to fruitlets, with scarred fruits remaining on the tree to harvest. Handheld mechanical blossom thinners allow the operator to thin blossoms on a wider range of tree styles including reaching into the canopy anywhere where the thinning head can penetrate. Mounted string style mechanical thinners such as the Darwin (see below) can only work on the outside of the tree, which limits their usefulness to narrower tree structures. The operator has control to thin limbs and laterals as long as these are accessible. The main difficulty is judging how vigorously/hard to use it. This can be regulated by the speed of rotation of the head which is adjustable, the speed with which it is made to pass over the branches and the distance from the branch at which it is operated. In the trials it was an effective method, but did not give as good results as thinning by judicious removal of branches by the skillful experienced grower.

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### *Important questions*

- Does historical data show consistently that thinning is necessary?
- Are the flower cluster numbers twice as high (or more) than necessary for a good set?
- Is the forward weather forecast favourable for pollination and fruit set?
- Is the plantation frost protected?
- Is pollination likely to be adequate?

### *Advantages*

- Modest labour requirement (10 – 100 s per tree, depending on tree size and architecture)

### *Disadvantages*

- Blossom thinning is done before fruit set is known. Difficult to judge if it is necessary/worthwhile, or even if it is detrimental should there be a frost or poor set
- Difficult to control intensity to the optimum level
- Can lead to fruit scarring damage if done too late
- Wounds could become infected with bacterial canker

### Mounted string style mechanical blossom thinners (e.g. Darwin)

The application, considerations, advantages and disadvantages are broadly the same as for the hand held devices (see above). However, mounted string style mechanical thinners such as the Darwin (see below) can only work on the outside of the tree, which limits their usefulness to narrower tree structures e.g. those grown on the fruit wall system. The Darwin (see [www.fruit-tec.com](http://www.fruit-tec.com)) is the most widely used in the UK. Machines are available with working heights of 1.935, 2.395 and 2.850 m. Current cost for a Darwin 250 with a working height of 2.395 m is £7500 + VAT depending on the type of mounting on the front of the tractor. The strings are 600 mm long. Driving speeds of 6-18 Km/h. However, the advantage is that the machine operation is tractor driven and has a very low labour requirement and cost.

### *Important questions*

- Does historical data show consistently that thinning is necessary?
- Are the flower cluster numbers twice as high (or more) than necessary for a good set?
- Is the forward weather forecast good and for settled weather?
- Is the plantation frost protected?
- Is pollination likely to be adequate?

### *Advantages*

- Very low labour requirement (1.5 – 2.5 ha per hr, depending on forward speed and row spacing)

### *Disadvantages*

- Done before fruit set is known. Difficult to judge if it is necessary/worthwhile, or even if it is detrimental should there be a frost or poor set
  - Only thins the outside of the tree
  - Difficult to control intensity to the optimum level
  - Can lead to fruit scarring damage if done too late
  - Wounds could become infected with bacterial canker

### Eclairvale mechanical thinner

The Eclairvale tractor drawn mechanical blossom and fruitlet thinner ([www.lacannevale.fr](http://www.lacannevale.fr)) uses a non-powered rotating brush of long flexible rods to remove blossoms or fruitlets. It is an important new development and provides new opportunities for UK tree fruit growers including and especially plums. As far as we are aware it has not been tried in the UK but it has been extensively tested and is in commercial use in other European countries. Two models

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are available, the FR model with a rotor height of 2.5 – 4 m and the EH which has a rotor height of 1.6 or 2.5 m but which can be operated at a starting height of 0- 1.15 m. The current cost is approximately Euro 25,000.

The Eclairvale can be used to thin flowers or small fruits. It penetrates 1.40 m into trees, and can be used on a wide range of tree shapes including walls. On one commercial farm in Europe it was used in 2015 on a plum fruit-wall at the small-fruitlet stage, fully eliminating the need for hand thinning and saving 200 hours of labour per hectare. Eclairvale thins 1 ha of flowers or fruitlets in about an hour, depending on row spacing and tree shape (a calculator is provided on the company website). Fruitlet thinning takes slightly longer than flower thinning.



### *Important questions about the use of the Eclairvale for flower thinning*

- Does historical data show consistently that thinning is necessary?
- Are the flower cluster numbers twice as high (or more) than necessary for a good set?
- Is the forward weather forecast good and for settled weather?
- Is the plantation frost protected?
- Is pollination likely to be adequate?

### *Advantages*

- Very low labour requirement (>1 ha per hr for flower thinning, depending on forward speed and row spacing)
- Eclairvale machine is flexible because it can be used for both flower and fruitlet thinning on plums
- Penetrates up to 1.4 m into tree so can be used on wide canopies, and on trees up to 4 m tall
- Less damaging to tree than powered string mechanical thinners (Darwin, Powercoup)

### *Disadvantages*

- Done before fruit set is known. Difficult to judge if it is necessary/worthwhile, or even if it is detrimental should there be a frost or poor set
- Wounds could become infected with bacterial canker

### *Chemical methods of thinning plum flowers*

Most chemicals that have been tested and found effective in preventing plum flowers setting fruits work by desiccating the flower organs and preventing pollination and/or fertilisation (fruit set). There are a number of chemicals that work in this way but the only one currently available to UK growers is the nutrient ammonium thiosulphate (ATS). This foliar nutrient has a very useful side effect as a blossom thinner on tree fruit crops. If applied at flowering time, ATS works by desiccating and, therefore, damaging the stigmas and styles of plum flowers, so preventing them from setting fruits. Lime sulphur was used many years ago as a thinner for Victoria plum but there are no approved uses for it and no products available in the UK currently. Hormonal substances (e.g. ethephon) have been used for thinning plums in other countries, but although products containing ethephon are available and approved for use on cereals in the UK, none are approved for use on plum. Hormonal substances are more selective in the way they act and are absorbed directly into the fruit or through the leaves causing abscission.

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When using ATS as a blossom thinner on plums it is important to consider the best timings for the sprays, the ideal weather conditions, the optimum spray concentrations and any variations in treatment associated with different scion varieties. ATS is now routinely used in the UK and has been widely trialed on plums in Europe. Good results have been achieved by applying ATS when the older bearing wood is in full bloom, followed by a second spray when the one year old wood is flowering. The second spray does not always result in extra thinning. It has also been found that the risk of excessive thinning from two applications is relatively small. The recommended dose is 18 to 22 liters ATS (58% active ingredient) per hectare at a concentration of 1.1 – 2 % of the water used. Although the petals of flowers at the white bud stage are damaged by ATS sprays, the flowers still remain capable of setting fruits. Flowers that have been open for more than two days and have been pollinated by bees will often still set fruits, although damaged by the ATS sprays. In seasons when flowering is concentrated over just a few days, then a single treatment with ATS will often be sufficient to thin the trees effectively. In years when the blossoming period is extended, two sprays may be required as described above.

- As the temperature increases above 15°C, the efficiency of thinning when using ATS is increased
- Spraying in dry weather has been found to be more effective for plums whereas on apples a high relative humidity worked best. Slow drying conditions (high humidities) may also increase the risk of phytotoxicity to leaves
- In most cases it is recommended that no additional adjuvant is added to the proprietary ATS products
- Do not tank mix ATS with any other spray material or apply within 2 days of applying other sprays, or excess leaf damage may occur
- Varieties may differ slightly in terms of their thinning requirements and hence in the ideal ATS treatment required for optimum thinning

### *Hand flower cluster thinning*

Hand removal of flower clusters on newly planted trees may be appropriate in the first one or two seasons, but on more established trees hand thinning is likely to be prohibitively costly.

## FRUITLET THINNING

Before contemplating the need for fruitlet thinning, it is vital to determine what proportion of the fruitlets that have set and the numbers of fruitlets (number of clusters and fruitlets per cluster) that are present per tree.

Set fruits contain a stone inside. Checking the proportion of fruits that have set needs to be done regularly from the early fruitlet stage (pea sized fruitlets) onwards. Cutting open a sample of at least 10 fruitlets, taken randomly from all over the tree, from each of up to 10 trees across the orchard may be needed. However, the sampling may be curtailed (by reducing the numbers of fruitlets examined per tree but not the number and need for sampling across the transect as the degree of set may vary substantially across the orchard) if the proportion of set fruitlets (i.e. with stones) is very high or low. Full sampling is needed if the results are intermediate. The assessments of the degree of set needs to be continued at least weekly until the fruitlets reach thumb-end size (15-20 mm).

The number of fruits per tree also needs to be assessed, which includes an assessment of the average number of fruitlet clusters per tree and the average number of fruitlets per cluster. This can be done at the same time and on the same sampling plan as the fruitlet set assessment and needs to be done thoroughly and carefully at least once at the final fruitlet set assessment. Compare the numbers present with the number required per tree to achieve the target orchard yield of adequately sized fruit (see Table 1 above)

If trees are healthy, growing well, provided with adequate irrigation and nutrition, and the fruitlets have set, little June Drop (late abscission after fruit set) is likely to occur.

### *Key tasks and thinning options:*

- Assess the proportion of fruitlets that have set (i.e. contain a stone) at least weekly from when the fruitlets are pea sized fruitlets up to they reach thumbend sized. Assess stoning in 10 fruitlets from 10 representative trees across orchard

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- Assess the average numbers of fruitlets per tree by assessing the numbers of clusters per tree and the number of fruitlets per cluster when the fruitlets have reached thumbend size (15-20 mm diameter).
- Compare the numbers of fruitlets per tree with the number required for optimum yield of adequately sized fruits
- If the numbers present are > 120% of numbers required, thinning may be warranted
- Thinning may be done mechanically with the Eclairvale mechanical thinner or by hand (see below)
- The Eclairvale is of very low labour cost (~ 1 hr/ha) but is less precise and more difficult to control. For this reason it is best to use it when fruitlet numbers are at least double those required
- If use of the Eclairvale mechanical thinner is not an option, then thinning by pruning out braches or parts of branches as part of normal tree pruning (which normally has to be done in dry conditions in spring when the trees are growing to minimize the risk of bacterial canker and other diseases) should be implemented first, before hand thinning is done. A reassessment of fruitlet numbers may be needed after this exercise
- Hand thinning has a high labour cost (up to 200 hrs/ha) but allows more control than the Eclairvale mechanical thinner. Hand thinning allows the largest and best shaped fruits to be retained and permits the establishment of even distribution of fruitlets along the tree's branches. It is the best way to achieve the correct crop load. Damaged, misshapen, small or shaded fruitlets and those on weak wood can be targetted. It is normally done in two stages: 1) quantity thinning to reduce the number of fruitlets per cluster by breaking the bunches , and 2) quality thinning to achieve the correct numbers of fruitlets per tree
- When hand thinning has been carried out, growers should double check the fruit numbers and do further hand thinning if necessary.

### *Mechanical fruitlet thinning*

#### Eclairvale mechanical thinner

The Eclairvale tractor drawn mechanical blossom and fruit let thinner ([www.lacannevale.fr](http://www.lacannevale.fr)) (see above) can also most importantly be used to thin fruitlets (note: powered string mechanical thinners such as the Darwin or Powecoup cannot be used for fruitlet thinning). This is an important new opportunity for UK plum growers. On one commercial farm in Europe it was used in 2015 on a plum fruit-wall at the small-fruitlet stage, fully eliminating the need for hand thinning and saving 200 hours of labour per hectare. Eclairvale thins 1 ha of fruitlets in about an hour, depending on row spacing and tree shape (a calculator is provided on the company website) fruitlet thinning taking slightly longer than flower thinning.

#### *Important questions*

- Are there excessive numbers of fruitlets (>200%) to achieve the target yield?

#### *Advantages*

- Very low labour requirement (~1 ha per hr for fruitlet thinning, depending on forward speed and row spacing)
- Appears to do little or no damage to remaining fruitlets, or to the tree itself
- Mechanical thinning can be done to reduce the need for and cost of subsequent hand thinning, possibly to obviate the need for hand thinning altogether
- Penetrates up to 1.4 m into tree so can be used on wide canopies, and on trees up to 4 m tall

#### *Disadvantages*

- Degree and distribution of thinning cannot be precisely controlled
- Wounds on the tree, even if only few, are inevitable. There is therefore an increased risk of bacterial canker or other diseases. Mechanical thinning should be done when the canopy is dry and when rain is not forecast to minimize this risk

### **Hand fruitlet thinning**

Hand thinning of plums allows the largest and best shaped fruits to be retained and permits the establishment of even distribution of fruitlets along the tree's branches. However, hand thinning demands much costly labour

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should only be implemented after the alternative strategies described above (blossom thinning, mechanical fruitlet thinning) have been considered and implemented where necessary.

### *Quantity hand fruitlet thinning*

Quantity thinning is the process of reducing the number of fruitlets per cluster by breaking the bunches. The assessment of the average numbers of clusters per tree and the average numbers of fruitlets per cluster should indicate the need for reducing the numbers of fruitlets per cluster to achieve the target yield potential. The numbers of fruitlets in each cluster is reduced to the target number (e.g. one or two) by tearing off excess ones. This needs to be done by pulling in the right direction and the right action to avoid tearing of the cluster altogether, leaving the largest, darkest green, healthiest fruitlets in the cluster. It needs to be done rapidly and skillfully.

### *Quality hand fruitlet thinning*

After quantity thinning has been done and allowing at least a week to elapse for the damage done by it to the cluster to settle and heal, a second round of quality thinning may need to be implemented to reduce the number of fruitlets to the target number per tree to achieve optimum potential yield and quality. It may be helpful to check the number of fruitlets per meter of branch length need to remain, or the average separation of fruitlets along the branch (e.g. 1 or 2 per 5 or 10 cm).

## **Caution**

The information contained within this Best Practice Guide is correct to the best of the authors' knowledge at the time of compilation but it must be understood that the biological material/systems and the regulatory framework referred to within these guides are subject to change over time. Anyone looking to make use of the information should check it against prevailing local conditions.

All pesticide recommendations and approvals are subject to change over time and the user of this Guide is reminded that it is his/her responsibility to ensure that any chemical intended for use by them is approved for use at the time of the intended application. The user is reminded that they must carefully read and follow the label on each chemical before applying any treatments.