

# JUNE 09 FUTURE ORCHARD 2012 WALK



## Pipfruit Pollination

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Inadequate pollination is one of the limiting factors identified in some Australian pipfruit orchards and hence the need to remind growers of the factors they need to be mindful of.

Self-infertility is widespread in pipfruit, which means that for fruit to set, viable compatible pollen must be transferred to their flowers from another cultivar.

Most pear cultivars are unable to set fruit with their own pollen, as are some apple cultivars, notably Red Delicious and all triploid varieties, eg, Gravenstein, Jonagold. Triploid varieties as a rule do not produce viable pollen, so are also incapable of pollinating the diploid varieties which make up the majority of apples.

Many diploid apple varieties can show partial self-infertility and will set some fruit with their own pollen under very favourable conditions for fruit set. As conditions for fruit set are not always favourable it is too risky to attempt to grow apples without good provision for cross pollination.

Pipfruit flowers are designed to be insect pollinated with the honey bee the most common pollen vector. It is possible that other insects play a minor role, as might wind in some situations.

Our experience of fruit set in Australian orchards gained through the "Future Orchards 2012" project indicate that lack of adequate pollination, particularly in orchards under hail net, is a major limiting factor to orchard performance.

Observations we have made on pipfruit cropping shows that in apples, pollen transfer will extend 10 to 15 metres along a row from a pollen source, and in pears pollinator influence will sometimes extend as little as 3 to 5 m if conditions for pollination are very adverse and the variety particularly difficult to pollinate.

Modern orchards tend to be planted intensively in hedgerows. With this type of planting bee travel is predominantly along, rather than across rows, so there is very limited transfer of pollen between rows. Hail netting tends to accentuate this effect compared with orchards not protected by hail net over the pollination period.

### Pollinator Requirements

Donor pollen varieties need to have the following characteristics:

- Produce compatible pollen.
- Commence flowering just ahead of the variety being pollinated, and flower long enough to overlap the first half to two thirds of the target variety flowering period.



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- Have little biennial bearing tendency.
- If a fruiting variety, has fruit significantly different in appearance from the target variety.
- Compact growth or spur type growth can be an advantage.

Common pollinator varieties are:

- Flowering crabapples with proven compatible pollen.
- Commercial cultivars such as Granny Smith, Sturmer Pippin, spur type Red Delicious, Golden Delicious, and for early flowering cultivars possibly Sundowner.

Among these, Granny Smith is the most widely used because it flowers reasonably early, is not prone to biennial bearing, has a long flowering period and is very different in appearance from most other cultivars.

## Layout

The preferred pollinator layout for uniform distribution of pollinators is pollinators in each row at 15 to 20 metre intervals, with those in alternate rows positioned half way between the pollinators in the rows alongside them.

If the orchard block had other sources of cross pollination and no overhead net then large blocks might be planted with a 1/20 pollinator pattern as shown in the first example below. If the orchard block had overhead net and little other plantings that could contribute to cross pollination then the 1/10 option shown second is probably justified. The 1/10 option is common in Europe under net.



1/20 ratio = 5%

At 1.5 m spacing no tree is more than 7.5 m from a pollinator

Pollinator = x

0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0
X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	X
0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0
X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	X
0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0
X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	X
0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0
X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	X
0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0
X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	X
0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0
X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	X
0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0
X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	X
0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0
X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	X
0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0
X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	X

1/10 ratio = 10%

At 1.5 m spacing no tree is more than 3m from a pollinator

Pollinator = x

0	0	0	0	0	X	0	0	0	0	0	0	0	0	X	0	0	0	0	0
X	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	X
0	0	0	0	0	X	0	0	0	0	0	0	0	0	X	0	0	0	0	0
X	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	X
0	0	0	0	0	X	0	0	0	0	0	0	0	0	X	0	0	0	0	0
X	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	X
0	0	0	0	0	X	0	0	0	0	0	0	0	0	X	0	0	0	0	0
X	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	X
0	0	0	0	0	X	0	0	0	0	0	0	0	0	X	0	0	0	0	0
X	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	X
0	0	0	0	0	X	0	0	0	0	0	0	0	0	X	0	0	0	0	0
X	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	X
0	0	0	0	0	X	0	0	0	0	0	0	0	0	X	0	0	0	0	0
X	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	X
0	0	0	0	0	X	0	0	0	0	0	0	0	0	X	0	0	0	0	0
X	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	X

Pollinators should be planted with the main variety and for in-row spacings 1.5 m or less, given a whole tree site rather than being interplanted.

Grafting pollinators into existing trees is another option, but as in some climates upper tree flower timing lags behind the lower tree, pollinator grafts need to be in the lower tree to ensure they flower with the target variety.

**Bees**

Adequate bees are essential for good pollination. Recommended hive density is two to three strong hives per hectare, pears may require a higher hive density.

To maximize bee activity, the hives must be located in a sunny sheltered position. In sloping orchards, the hives should be towards the base of the slope, so heavily laden bees fly down hill back to the hive.



Bring bees in when 5 to 10% of the blossom is open, and remove in early stages of petal fall of two year and older wood. If bees are introduced too early, they search out alternate nectar sources and will work these instead of the pipfruit blossom.

Bees require a regular clean water supply. It needs to be near their hive.

### **Hail Net**

As a general rule, it is more difficult to achieve good fruit set under hail net.

Where possible and practical, hail nets should be left open over the flowering period.

In hail netted orchards, bee hives need to be well distributed through the block, and placed inside the netted area.

Bees can become disoriented under hail net, so will be more likely to return to their hive if its position is marked with a distinctive feature above the hive that the bees can recognize, eg, a painted square or disc above the foliage suspended from the net.

Where there is clearance of 1.5 to 2 metres between tree top and net, bees will work much better than under gabled net structures where tree tops extend towards the peak of the gable and are higher than the valley between the gables.

Bee hive density may need to be increased in netted orchards if clearance between net and tree foliage is limited.

