

VARIETY INFORMATION

Okanagan Plant Improvement Corporation (PICO)

PICO is a company owned by the British Columbia Fruit Growers Association (BCFGA) dedicated to the improvement and commercial development of fruit varieties for the purpose of enhancing grower returns and contributing to the viability of a successful fruit industry.

The Importance of Certified Nursery Stock

Fruit growing represents a long term investment in which the trees are the basic units of production. A mistake made in selecting the stock may adversely affect productivity throughout a lifetime. PICO operates a Certified Budwood orchard, which is intended to provide wood that is true-to-type and free from pests and diseases for which the wood has been tested.

Growers and nurserymen should be certain the variety and strain they are propagating or planting is true to name. Propagating wood from true-to-name, indexed trees of many of the better strains of most kinds is available from:

PICO Certified Budwood Program
P.O. Box 6000,
Summerland, B.C. V0H 1Z0;
telephone 250-404-0088 or fax 250-494-7472.
Email address is info@picocorp.com

Final deadlines for ordering scion wood are as follows:

Jan 15 - Winter/Spring deadline

June 1 - Summer/Fall deadline

Supply depends on availability. Orders received by the dates listed will have priority.

Nursery Stock Requirements

As nursery stock supplies are frequently short it is important for growers to order trees one or two years in advance in order to acquire the desired varieties.

Plant Breeders Rights

Plant Breeders Rights (PBR) legislation offers variety discoverers and breeders an opportunity to be compensated for their efforts. Anyone who finds a new variety or limb sport which may be of interest to others should contact PICO.

The existence of PBR means that royalties will have to be paid for new varieties; this encourages rights holders in other countries to make their varieties available in Canada, and so increases the number of options growers will have for planting. Most new varieties are now protected including those from the Pacific Agriculture Research Centres (PARC), Canada.

Growers are invited to test new fruit varieties that are available. Test varieties, where propagation wood is in limited supply, may be distributed in such a way that there is a trial in each district. The aim is to see how varieties perform in a range of conditions. For varieties being tested, a tester's agreement must be signed with PICO. This includes all unnamed Summerland selections, chance seedlings, and varieties developed in other countries.

ROOTSTOCKS

Rootstocks for Apples **CLONAL ROOTSTOCKS** *Malling Series*

Most Malling stocks produce trees of smaller than standard size. Malling 9 is by far the most popular stock for this purpose. However it is important to note that these stocks are not as hardy as hardy

seedling varieties. Malling 2 is a semi-standard tree; M.4, which is distinct from and not to be confused with MM.104, a slightly smaller tree; M.7 a semi-dwarf tree; and M.9 a dwarf tree. The M.26 stock is only slightly less vigorous than M.7. M.7 is winter tender and damage to the rootstock has occurred in some years historically. Trees on stocks of semi-standard vigour may require staking in early years, while trees on dwarf or semi-dwarf roots will require staking for the life of the planting.

MM.104 and MM.106 are so susceptible to crown rot that they are not recommended.

A number of sub-clones of M.9 (selections within the clone, usually made by nurseries for better stoolbed production) exist. Most of the M.9 rootstocks planted in the Okanagan valley in the past decade are the M.9 T337 sub-clone. Other sub-clones include Pajam1, Pajam2, RN29 (Nic29), and Fleuron 56. The “standard” M.9 sub-clone is the virus-free version of M.9 from East Malling usually called M.9 EMLA. Some M.9 sub-clones differ in vigour control. Pajam2 and Nic29 give a slightly larger tree, between M.9 and M.26 in size, and may be useful to some growers. In trials at Summerland, Pajam2 and Nic29 did not affect suckering, but in some parts of eastern North America, these two sub-clones produced more root suckers than M.9 EMLA. Trees on T337, Fleuron 56 and Pajam 1 were all about the same size as those on M.9 EMLA in trials at Summerland. None of the sub-clones listed above affect scion fruit size.

Other Dwarfing Clonal Rootstocks

Budagovsky 9 (B9 or Bud9) and Ottawa 3 (O.3) are more cold hardy than M.9 and lower the risk of winter injury in cold sites. Both are precocious and productive. B9 and O.3 produce trees that are slightly larger than M.9 in size but smaller than trees on M.26. Propagators report poor bud take on O.3 with scions that have a latent virus infection. **If budding scions onto O.3, ensure that the Scionwood is certified virus-free.**

Mark is another dwarfing rootstock that tends to produce an overgrowth of tissue at the soil line. Trees on Mark tend to “runt out” even with drip irrigation. Mark also appears to induce smaller fruit size on the scion. Mark is not recommended for these reasons.

Seedling Rootstocks

For economic reasons dwarfing rootstocks should

be used. However if standard trees are desired, Antonovka, Wealthy or Haralson seedlings should be used. Seedlings of these varieties are expected to be hardier than those of tender varieties such as Delicious. The “average” resistance to crown rot should be greater than that of the susceptible clonal stocks (see section on “Susceptibility of Rootstocks to Crown Rot”, following).

Susceptibility of Rootstocks to Crown Rot

The most popular growth-controlling clonal rootstocks planted in this region are susceptible to crown rot disease. Almost all of our irrigated orchard soils are infested with the fungus that causes it. There are no preventive or curative measures that are considered satisfactory. Heavy losses of trees to this disease have occurred with some of these rootstocks in individual plantings, while in other orchards with the same rootstocks losses have been negligible. There is no explanation yet for these phenomena. However, growers should be warned of the potential hazards from crown rot infection.

The rootstocks shown below are grouped in order of increasing susceptibility.

M.9, M.4, B9 Losses to crown rot of these stocks have occurred in this region, but they have been relatively rare, thus their use is recommended where their particular degree of vigour is desired.

M.26, O.3 In recent plantings of M.26 crown rot losses have been more frequent than in past years. These losses may be due to winter injury predisposing the rootstock to crown rot.

M.2, MM.111 Losses to crown rot have been more frequent with M.2 than with those rootstocks listed above, but have been serious in only a few orchards.

M.7 This stock is susceptible to crown rot and appreciable losses have occurred in some plantings.

MM.104, MM.106 These stocks are very susceptible to crown rot and heavy losses have occurred in some orchards. The risk of losses occurring in plantings of these stocks is high.

ROOTSTOCKS FOR CHERRIES

Mazzard and Mahaleb seedlings and the clonal selection of Mazzard F 12/1 are recommended as

rootstocks for cherries. Colt is a new cherry rootstock that produces a tree that is similar in size to F12/1. Winter hardiness of Colt in British Columbia is unknown, but it is reported to be more susceptible to winter injury in the nursery than Mazzard or Mahaleb in other regions. Edabriz (Tabel), a clonal *Prunus cerasus* rootstock developed in France, produces highly productive trees that are more dwarfed than those on Colt. Several Weiroot® (German) selections show promise in producing trees ranging in size from 30% to 60% the size of trees on F12/1. The Gisela® series are another dwarfing cherry rootstock from Germany; producing a precocious tree that vary in size from 45% to similar in size to Mazzard. Gisela 5® is a dwarfing rootstock at 50% of standard size, while Gisela 6® produces a tree similar in size to Mahaleb. **Limited information is available about these rootstocks under North American conditions. At this time, only test plantings of these rootstocks are recommended. Contact PICO for further information.**

There have been reports that some clones of Mahaleb have shown signs of incompatibility with Van and some offspring of Van which would include most of the varieties from PARC. Van was a parent of Stella, Lapins, and Sweetheart. Stella, Lapins, and Sweetheart have been used a lot as seed and pollen donors for crosses.

HARDY ROOTSTOCKS FOR PEACHES

Siberian C

Siberian C is one of the hardiest rootstocks available for peach production. Siberian C is not only root hardy but induces hardiness of the flower buds and scion.

Bailey

Bailey is an acceptable seedling rootstock that is close to Siberian C in root hardiness. Easy to germinate. Seedlings are susceptible to mildew in the nursery. It appears to be more susceptible to root lesions.

Haggith

Haggith is a hardy, vigorous, rootstock for peaches that has potential.

ROOTSTOCKS FOR PEARS

Old Home x Farmingdale clones 69 and 87 are recommended as alternatives to Bartlett seedling. Neither provides much size control but both are slightly more precocious and productive. Trials underway indicate that Quince A has potential as

a rootstock in the warmer areas of the Okanagan Valley.

Varieties for Commercial and Trial Plantings in B.C.

The information in this section is not intended as specific variety recommendations but is provided to assist in selection of varieties. This information is only a small fraction of the information available on the varieties discussed. Information on other aspects of the variety and from many other sources should be taken into consideration when making a decision on varieties to plant. This information is compiled from a number of sources and local experience. The descriptions of the varieties are intended to assist growers in making planting decisions, but are not recommendations. Your packinghouse should also be consulted prior to making variety decisions. More information is available about the cultural aspects than the marketability of new varieties.

APPLES – (In order of Harvest)

Summer Varieties

SUNRISE

Maturity Season: Early season, mid August to early September in B.C.

Harvest Criteria: Based on ripe eating taste and background colour change from green to cream/yellow.

Fruit Description: Medium to large in size. Taste is sweet and sub-acid. Skin colour is pinkish/red blush and stripes over a cream/ yellow ground. Flesh is white to cream in colour.

Tree Description: Vigorous, spurry and fairly precocious.

Production: Very productive and precocious. A multiple pick variety.

Strains: None

Advantages: Early season bi-colour apple.

Disadvantages: Storage life is very short. Marketing period is limited to pre-Gala timing. For niche markets only. Susceptible to apple scab.

Storage: Very short, direct sales only.

Planting Trends: Current planting considered adequate. Planting in later areas will be limited to direct sales as normal retail trade will not take Sunrise once Galas are available

Comments: Market acceptability is limited. Use caution if planning on planting this variety. Niche market only.

GINGER GOLD

Canadian Plant Breeders Right 0389

Maturity Season: Early Season, Mid August to early September in B.C.

Harvest Criteria: Based on skin colour change from green to yellow colour and 25% to 50% of the seeds with colour change.

Fruit Description: Taste is sweet and sub-acid. Skin colour is yellow with no over colour. Flesh is white to cream in colour.

Tree Description: Vigorous, spurry and fairly precocious.

Production: Very productive. 1 to 2 picks.

Strains: None

Advantages: Early season yellow apple.

Disadvantages: Storage life is short. Extremely short harvest window. Very susceptible to mildew and fire blight. Unproven market acceptance.

Storage: Very short, direct sales only.

Planting Trends: Limited planting.

Comments: Market acceptability is limited. Use caution if planning on planting this variety.

GALA

Maturity Season: Early Season, Late August to mid September in B.C.

Harvest Criteria: Based on starch conversion and ground colour change from green to creamy-white colour. Starch charts are available.

Fruit Description: Taste is sweet and sub-acid with distinctive aromatics. Skin colour is 40 to 90% orange red blush, stripes and flecks over cream yellow ground. Creamy yellow flesh is firm, crisp and juicy.

Tree Description: Vigorous, spurry and fairly precocious. Wood is very brittle. Caution is advised when manipulating branches during tree training.

Bloom and Pollination: Can have an extended blossom period.

Production: Very productive. This variety needs prompt and adequate thinning to ensure good fruit size. Fruit on over-cropped trees may not mature in a timely manner. Royal and Imperial are multiple pick varieties. New strains may be 1 or 2 pick varieties.

Strains & Standard Sports: Royal and Imperial,

New high Colour Sports; Davison Gala, Brookfield, Olsen two, (Pacific), Gales, Galaxy, Mitchgla. There are many sports and strains. Contact your field person for recommendations. Buckeye and some other blush strains are not recommended.

Advantages: World known variety, accepted as a commodity type apple. B.C. can produce high quality fruit. Annual cropping

Disadvantages: World production of Gala is increasing. Royal and Imperial are multiple pick varieties. Fruit size can be small. Susceptible to powdery mildew, apple scab and fire blight.

Storage: 3 1/2 months in air
Perhaps 6 months in CA

Planting Trends: Increasing in North America and the World. High coloured one pick strains and sports dominate plantings.

MCINTOSH

Maturity Season: Early September in B.C., with or just after Gala.

Harvest Criteria: Dependent on the change to red in the skin over-colour. Lack of red colour will reduce the packout.

Fruit Description: Taste is sweet/tart and unique. Skin colour is red blush over green ground. Flesh is white.

Tree Description: Moderately vigorous, and moderately precocious.

Production: Moderately productive and precocious. Needs prompt and adequate thinning to ensure fruit size. 1 to 2 picks.

Strains: Summerland Red Mac, Morspur, Marshall, Macspur, DS 99 (RedMax) and others. Summerland Red Mac and Morspur are the recommended clones.

Advantages: "Mac" is an established variety in Canada and has a consumer following.

Disadvantages: Attaining adequate colour can be a problem. Storage life is short. Stored fruit can lose pressure quickly resulting in a short shelf life. This variety is subject to stem punctures and bruising at harvest. Care in handling is essential. Suffers from pre-harvest drop. Susceptible to scab, mildew and fire blight

Storage: Short, about 8 weeks in 1°C air. Longer in CA

Planting Trends: Declining rapidly, current production is more than adequate.

Comments: While market acceptability is known over production and poor storage qualities may result in low returns. Use caution if planning on planting this variety.

HONEYCRISP

Canadian Plant Breeders' Right 1007

Maturity Season: Early Season, slightly after McIntosh in B.C.

Harvest Criteria: Based on skin colour, fruit pressure and starch conversion. The fruit can be very slow in developing over-colour. Excess nitrogen can inhibit fruit colouring.

Fruit Description: Taste is sweet and sub-acid. Skin colour can be 40 to 90% pink red blush and/or stripes over green/yellow ground. Creamy yellow flesh is firm, crisp and juicy. Fruit has a dull finish and a dimpled appearance.

Tree Description: Non-vigorous, spurry and fairly precocious. Growth is very weak after fruiting commences. Leaf mottling and some leaf edge necrosis are inherent in the variety. Tree is very cold

hardy, perhaps up to -40°C. Reports of extreme biennial bearing.

Production: Moderately productive. Can be very biennial. Can suffer preharvest drop.

Strains: There are reports that there may be 2 distinct strains of Honeycrisp. One that colours well (blushed) and one that colours poorly (striped). This has not been substantiated in B.C.

Advantages: New variety that is getting a good reputation for eating quality in the world. Some promotion of the variety has occurred in the world. Very limited plantings in B.C.

Disadvantages: Can be very biennial. Achieving colour on the fruit can be difficult. Fruit size and appearance are very unstable. Keeping fruit size down to an acceptable level can be a problem. Bitter pit in large fruit. Tree is susceptible to mildew. Fruit is susceptible to soft scald in storage. Reports of internal browning in stored fruit

Storage: 3 1/2 months in air . Perhaps 6 months in CA

Planting Trends: Increasing in North America and the World. Slow increase of plantings in B.C.

Comments: This variety has many challenges that growers may or may not be able or willing to overcome. A world-wide program to remedy some of the challenges has been undertaken. Caution is advised when considering planting this variety.

EARLY FUJI

Maturity Season: Mid September in B.C.

Harvest Criteria: Harvest by starch conversion, taste and red over-colour.

Fruit Description: The taste is sweet, size is large.

Tree Description: Moderate vigour, spreading, precocious.

Production: Unknown

Strains: Auvil Early Fuji, Autumn Rose, September Wonder.

Advantages: Works for Northern regions with shorter season where growing standard Fuji can be a problem or as an Early Fuji as long as can be sold before traditional Fuji matures.

Disadvantages: Biennial bearing.
Storage: Not as good as Standard Fuji.

Planting Trends: Limited.

Comments: May have some potential in the Southern Okanagan as a pre-Fuji.

GOLDEN DELICIOUS

Maturity Season: Mid to late September in B.C.

Harvest Criteria: Harvest by starch conversion. Starch conversion charts are available. Do not use colour as a harvest indicator.

Fruit Description: The taste is sweet and slightly tart. Skin colour is green/yellow with no over colour. The flesh is white to cream in colour.

Tree Description: Vigorous, productive and precocious.

Production: Very productive and precocious. Needs prompt and adequate thinning to ensure fruit size. 1 to 2 picks. Can be biennial bearing.

Strains: No specific colour strains. Gibson Golden (Smoothie™) is somewhat russet resistant. Numerous spur-type clones. Spur-type clones have inferior internal quality compared to non-spur types.

Advantages: “Golden” is an established variety in the world and has a consumer following. It is the most planted yellow apple. Productive, used as pollinizer for many varieties.

Disadvantages: Skin russet can be a problem. Some biennial bearing. Can bruise at harvest, requires care in handling. Cannot be used to pollinate first generation off-spring e.g. Jonagold.

Storage: Long storage in CA.

Planting Trends: Declining in the last few years.

Comments: Golden Delicious production has declined worldwide in the last few years.

Mid Season

AMBROSIA

Canadian Plant Breeders’ Right 0388

Maturity Season: Late September to Early October in B.C.

Harvest Criteria: Harvest by starch conversion only. Ambrosia starch conversion charts are available. Do not use colour as a harvest indicator. Starch in the fruit of Ambrosia converts at about 1.5 units per week. This gives Ambrosia a short harvest window

Fruit Description: The taste is sweet; the flesh is crisp, juicy and aromatic. Skin colour is cream/yellow ground with distinctive 40 to 80% pink/red over-colour. The over-colour is blush and broad faint stripes. The flesh is white to cream in colour. The fruit is very clean.

Tree Description: Moderately vigorous, and very productive and precocious. Tree is very upright and spurry. Growth in the first year after budding or grafting can be slow. Well suited to super spindle plantings.

Production: Very productive and precocious. Needs prompt and adequate thinning to ensure fruit size. 1 to 2 picks. No reports of biennial bearing. Over cropped trees or trees treated with excessive nitrogen result in poor coloured fruit with low storability.

Strains: None

Advantages: Ambrosia is a new cultivar creating grower, buyer, and consumer interest. The fruit is easy to harvest and packs well. Release of the variety in the world will be under controlled planting and production agreements. Growers are committed to promoting this variety.

Disadvantages: Short harvest window.

Storage: Moderate storage life in air and CA. Similar or less than Gala.

Planting Trends: Increasing dramatically in the last few years

8S6923 /

AURORA GOLDEN GALA™

Canadian Plant Breeders' Right 1652

Currently decommercialized by Okanagan Tree Fruit Cooperative. Only useful for local sales.

Maturity Season: Late September to early October in B.C.

Harvest Criteria: Harvest by starch, (4-5 on the Cornell Generic or Jonagold) taste, and change in skin colour to yellow, (No. 4 on the Aurora Golden Gala colour chart).

Fruit Description: Medium in size, round conic in shape. Skin colour is yellow at harvest. Flesh is cream/white in colour, very crisp and very juicy. The taste is sweet and very mildly tart.

Tree Description: Moderately vigorous, and very productive and very precocious. Tree is very spurry. Well suited to super spindle plantings.

Production: Extremely productive and precocious. Extensive winter spur pruning is required to keep the number of fruiting sites manageable. Needs prompt and adequate thinning to ensure fruit size and even maturity. 1 to 2 picks. No reports of biennial bearing. Over cropped trees or trees treated with excessive nitrogen result in poor prolonged maturity season.

Strains: None

Advantages: 8S6923 is a new cultivar from the breeding program at PARC. It is a new yellow apple that has a long storage life and exceptional eating qualities. Extremely long storage and shelf life.

Disadvantages: Extremely grower intensive. Consumer response to another yellow apple is unknown. Can be hard to pick if trees are young. All marks are apparent, so must be marketed on its internal qualities, not its looks. Care should be taken to minimize bruising at harvest and the packing lines. Very new variety.

Storage: Very good storage life in air.

Planting Trends: Decreasing in the last few years.

Comments: This variety is very new to the apple world. Caution is advised when deciding whether or not to plant this variety.

SPARTAN

Maturity Season: Mid Season, mid to late September to early October in B.C.

Harvest Criteria: Based on starch conversion and red over-colour

Fruit Description: Medium to large in size, globose in shape. Taste is sweet/tart, and distinctive. Skin colour is 90 to 100% dark red blush over green ground. The white flesh is crisp and juicy.

Tree Description: Vigorous, spreading tree habit and fairly precocious. No spur types recognized. Has some blind wood.

Production: Moderately productive. 1 pick.

Strains: None

Advantages: Long storage life. B.C. grows very high quality Spartans. Very few other growing areas produce Spartan. Attaining colour is usually not a problem. 1 pick.

Disadvantages: Blind wood can be a problem. Needs adequate thinning to maintain fruit size. Needs adequate light penetration to maintain high fruit colour. Very few other growing areas produce Spartan. Historically, selling agencies have been able to maintain the price and market for the amount of Spartan grown in B.C., however the last few years have seen declining returns.

Storage: Fruit has been stored for long periods in CA. Up to 9 months.

Planting Trends: Stable in B.C.

Comments: Spartan breakdown in storage can be controlled with Calcium dips. Avoid excessive nitrogen applications.

SPA440 / NICOLA™

Maturity Season: Mid-Late season, Early – Mid October.

Harvest Criteria: Based on starch conversion, (3-4 on Cornell Generic starch chart) and background colour starts to break from green to yellow.

Fruit Description: Large in size. Taste is sweet with low acidity and high in aromatics. Skin colour is 80% cherry-red blush over green/yellow ground. The white/cream flesh is very firm, crisp and juicy. The fruit is borne on very long thin stems.

Tree Description: Low to moderately vigorous and with flat branch angles and some blind wood. Precocious and productive. Tree establishment is preferred over early cropping as growth can be weak after fruiting commences.

Bloom and Pollination: Very late season bloom.

Production: Moderate to good production.

Strains: None.

Advantages: Long storage and shelf life. Late bloom may be advantageous in frost-prone sites. Keeps well in air storage without becoming waxy

Disadvantages: Market response is unknown. Limited regional evaluations have been done on this variety. Some stem bowl russetting, more noticeable on first year fruit or after cool wet springs. Sunburn may be an issue; if overhead cooling is not available, a sunburn protectant and / or ensuring good leaf cover may help.

Storage: Very long storage potential and long shelf life.

Planting Trends: New release from PARC. Dramatic increase in plantings in the last few years.

Comments: SPA440 (Nicola™) is a mid-late season high quality apple variety. Growers interested in planting this variety are urged to contact PICO for information.

FUJI

Maturity Season: Late Season, mid to late October in B.C. With Braeburn

Harvest Criteria: Based on starch conversion, taste and red over-colour.

Fruit Description: Taste is sweet with little acid, and distinctive. Skin colour is 25 to 50% pink/red blush over green/yellow ground. The white/cream flesh is firm, crisp and juicy.

Tree Description: Moderate vigor, non-spurry habit and very precocious. Can exhibit biennial bearing. Can be difficult to train.

Production: Moderately productive but can bear biennially.

Strains: Many strains; Fuji BC and Redsport 2 are the most common in B.C. Newer sports include: Fuji 97, Kiku 8 and Myra.

Advantages: Unique taste has a consumer following. World class apple. Good storage potential. Developing markets in Canada.

Disadvantages: Can have a very long growing season. Production in China is expanding rapidly. Achieving colour can be a problem. Fruit can exhibit skin russetting, sunscald, and watercore.

Storage: Good with very good CA potential and long shelf life

Planting Trends: Stable in B.C. and the world with the exception of China. Some interest in new strains.

Comments: The production of Fuji in China has scared a lot of growers off planting Fuji. While caution is advised in planting this variety, there may be an expanding market in North America.

GRANNY SMITH

Maturity Season: Late Season, mid to late October in B.C. With Braeburn. Often picked earlier.

Harvest Criteria: Based on starch conversion, taste and market availability.

Fruit Description: Medium to large in size, round in shape. Taste is distinctively tart with some sweetness. Skin colour green with conspicuous white lenticels. The white flesh is firm, crisp and juicy.

Tree Description: Vigorous, slightly weeping in habit, and precocious. Has a tendency to tip bear.

Production: Very productive.

Strains: Regular Granny Smith is the only strain worth planting. Spur type Granny's are very inferior in fruit quality.

Advantages: Unique taste has a consumer following. World class apple. Good storage potential.

Consumer acceptance has allowed Granny to maintain its market and returns

Disadvantages: Can have a very long growing season. Fruit can exhibit, sunscald, and watercore. Fruit with pink/red blush may be undesirable in the market place. Moderately susceptible to apple scab, powdery mildew and fireblight.

Storage: Good with very good CA potential and long shelf life. Storage scald may develop if picked too early.

Planting Trends: The world market for green apples is stable.

Comments: Granny Smith has maintained its market share for the last few years. Solid green fruit colour may be maintained if the trees are kept vigorous and fuller than super-spindle. Some markets are rejecting fruit with blush and conspicuous white lenticels.

CRIPPS PINK PINK LADY®

Maturity Season: Very late season, late October after Fuji.

Harvest Criteria: Based on pink/red over-colour.

Fruit Description: Small to medium in size, conical, long oblate in shape. Taste is tart and distinctive. Skin colour is 25 to 70% pink/red blush over lime green/yellow ground. The skin of the fruit can have a dimpled (pebbled) appearance. The white/cream flesh is very firm, and somewhat dry. Fruit should be stored to achieve optimum flavor.

Tree Description: Vigorous with upright habit and moderately precocious. Can be difficult to train. Very distinctive leaves.

Bloom and Pollination: Can have very extended bloom.

Production: Moderately productive.

Strains: None. There are sports being produced in other fruit growing areas of the world, e.g. Pink Kiss. They are not available here at this time.

Advantages: Unique taste has some consumer following. Good storage potential. May have a place

in the tart apple market

Disadvantages: Can have a very long growing season. Very susceptible to fire-blight and apple scab. Achieving maturity can be a problem. Fruit size can be small. Sensitive to harvest and packing bruises. Tree is not grower friendly.

Storage: Good with promising CA potential and long shelf life

Planting Trends: Limited interest in B.C. Perhaps should be grown in only the earliest sites.

Comments: Pink Lady® is a registered trademark in Canada. There is an international organization dedicated to the promotion of Pink Lady apples. Caution is advised for growers; this variety matures very late in the season.

PEARS

BARTLETT

Bartlett has been the major pear variety planted in B.C. Difficulties in controlling pear psylla, declining markets and poor returns have reduced interest in Bartlett. Susceptible to fire blight.

Planting Trend- Declining. Some blocks of Bartlett have been removed.

ANJOU

Anjou has been the main winter pear grown in B.C. for many years.

Planting Trend- Declining.

BOSC

Bosc matures about 20 days after Bartlett. The tree is vigorous and productive. Stony pit virus is common in Bosc and disease free propagating wood is important. Bosc is a high quality pear and interest is increasing. Susceptible to fire blight.

Planting Trend - Increasing. Small plantings are being established.

Other Pears

CONCORDE CANADIAN PLANT BREEDERS RIGHTS APPLI- CATION # 94 276

Bred in the U.K., a cross of Comice x Conference. PBR application filed in Canada. Contact PICO concerning availability. This variety is very susceptible to Fire blight.

HARROWSWEET

Bred in Ontario, fire blight resistant, high eating quality, matures 3 weeks after Bartlett. Subject to PBR.

Other varieties generating some interest are Comice, Conference and Aurora.

Red Pears

Planting of red pears has stabilized. No significant plantings have been established in B.C. The market has not paid the premium prices for red pears that were anticipated.

Some red varieties of interest include:

STARKRIMSON

A red Clapp's Favorite with excellent eating quality. Short storage potential.

SENSATION

Considered to be the most promising red Bartlett.

REIMER RED

This is a Comice and Max Red Bartlett cross with excellent dessert quality fruit.

CASCADE

Another Comice and Max Red Bartlett cross that has large fruit with good yields. Dessert quality is also considered to be excellent. Cascade marks easily.

Asian Pears

Interest in Asian pears has also stabilized. Very few have been planted in B.C. Although Asian pears tend to be more precocious than European pears, yields are lower. Asian pears mark very easily. The varieties that are proving to be the best for the Cashmere area (quite similar to the Okanagan) in Washington State are Hosui, Kosui, Shinseiki, Chojuro, 20th Century, and A-Ri-Rang.

SOUR CHERRIES

There are no commercial processors of Sour Cherries in the Okanagan; therefore production is limited to fruit stand level sales. Care should be taken to obtain virus free planting stock since sour cherry yellows virus disease has been a problem in the past.

Planting Trend - Stopped.

APRICOTS – Commercial Varieties

Tomcot

Fruit from this variety is creamy/yellow with no blush. It is more flavorful than Goldstrike or Goldbar, but the fruit is smaller. The tree is not very winter hardy but is productive. The fruit ripens 3 or 4 days earlier than Goldstrike. It is not considered to be a shipping cot. Tomcot is partially self fruitful.

Goldbar

A productive new variety from Washington that bears large, good quality fruit. The fruit is orange with some red blushing. Harvest time is 1-2 days earlier than Goldstrike. Winter injury may be a problem for this variety. Requires cross pollination.

Goldstrike

A large sized orange cot with about 20% blushing. The fruit is firm with moderate juiciness and sweetness. This variety is considered a shipper to distant markets. Requires cross pollination with Rival or Goldbar. May be subject to pitting.

Rival

The fruit is yellow with rosy cheeks and is oval and large sized. The flavor is mild and has a fine texture. Requires cross pollination with Goldstrike or Goldbar. It ripens a week after Goldstrike.

Other Varieties

There is some interest in Hargrand, a large, juicy good flavored variety suitable for the fresh market from Ontario. Also Harglow, Harlayne and Harogem.

2E-15-5 is a medium size orange apricot that is quite firm, handles well and has very good flavor. It must be picked when full colour has developed. Matures just before Tilton. There is some interest in this PARC-Summerland selection.

Perfection

Perfection is an old variety that has very large fruit and ships well. Matures after Wenatchee / Moorpark. Susceptible to spring frost and requires pollination. Perfection lacks flavor but is quite popular in the market and for roadside stand sales.

Planting Trend – Declining

PUI SHA SIN

Early blooming and maturing apricot. It has very large size similar to a small peach. Pui Sha Sin has excellent exotic flavor. This variety has a long harvest period and requires 4-5 harvests. The skin is tender, bruises easily and the apricot is difficult to handle. Good for local sales.

Planting Trend - Small plantings have been established, but little interest otherwise.

Older Varieties

Varieties such as Wenatchee/Moorpark, Tilton, Skaha, and Goldrich are not recommended for commercial plantings under current marketing trends.

EUROPEAN PRUNES

EARLY STRAINS (Greata or Demaris)

Cultural Information- Pollinizer branches should be grafted into Early Italian trees or pollinizers planted to improve cropping. Good pollinizers are Peach Plum, Bradshaw Greengage or Damson.

Planting Trend - Stable

LATESTRAINS

Cultural Information - Late strains of Italian prunes should be removed if they mature after September 15. Early maturity and good size are important. To achieve this, plant in warm locations, prune spurs and thin fruit.

Planting Trend – Stable

JAPANESE PLUMS

SANTA ROSA AND SHIRO

Both are attractive plums with good fruit size. They should be planted together for pollination at a ratio of four Santa Rosa to one Shiro. These Japanese plums require hand thinning and more than one picking. Shiro ripens 7 -10 days later and is firmer than Gold plum.

Other Varieties

Other varieties that have been suggested for planting in the past include Black Amber, June Blood,

Earliblue Fiebing, Ember, Ozark Gold, Ozark Premier, Friar and Starking Delicious.

Planting Trend - Most are small plantings for local and fruits and sales.

NECTARINES

CRIMSON GOLD

Earliest variety with commercial potential that is suitable for production in B.C.'s production areas. This variety is fairly attractive but does not have high red colour. Shelf life is limited in comparison to later maturing varieties.

Planting Trend - There are only small plantings of this variety.

EARLY SUNGRAND

This is an early to mid season variety ripening mid August. The fruit is medium size, firm and has overall red skin colour. Fruit quality is good but shelf life is limited. Winter hardiness is considered to be moderate.

Planting Trend - There are small plantings only.

FIREBRITE

Relatively new variety with some trial plantings in the South Okanagan. It has bright waxy cherry red skin colour. The flesh is yellow, firm and good quality. Splitstones can be a problem for Firebrite.

The tree is considered to be moderately vigorous and moderately productive but has not been fully evaluated. Recent experience indicates that this variety is difficult to grow because of disease and insect problems and because the predominately small size is difficult to market.

Planting Trend – Not recommended.

REDGOLD

Redgold is the most planted and has proven to be the most suitable nectarine variety for the Okanagan, but matures too late for some locations. The fruit has a bright waxy red colour and clear yellow flesh. Fruit size is large. Quality is excellent and yields are high, equal to good peach varieties. Redgold has average winter hardiness and resistance to spring frost.

Other Nectarines

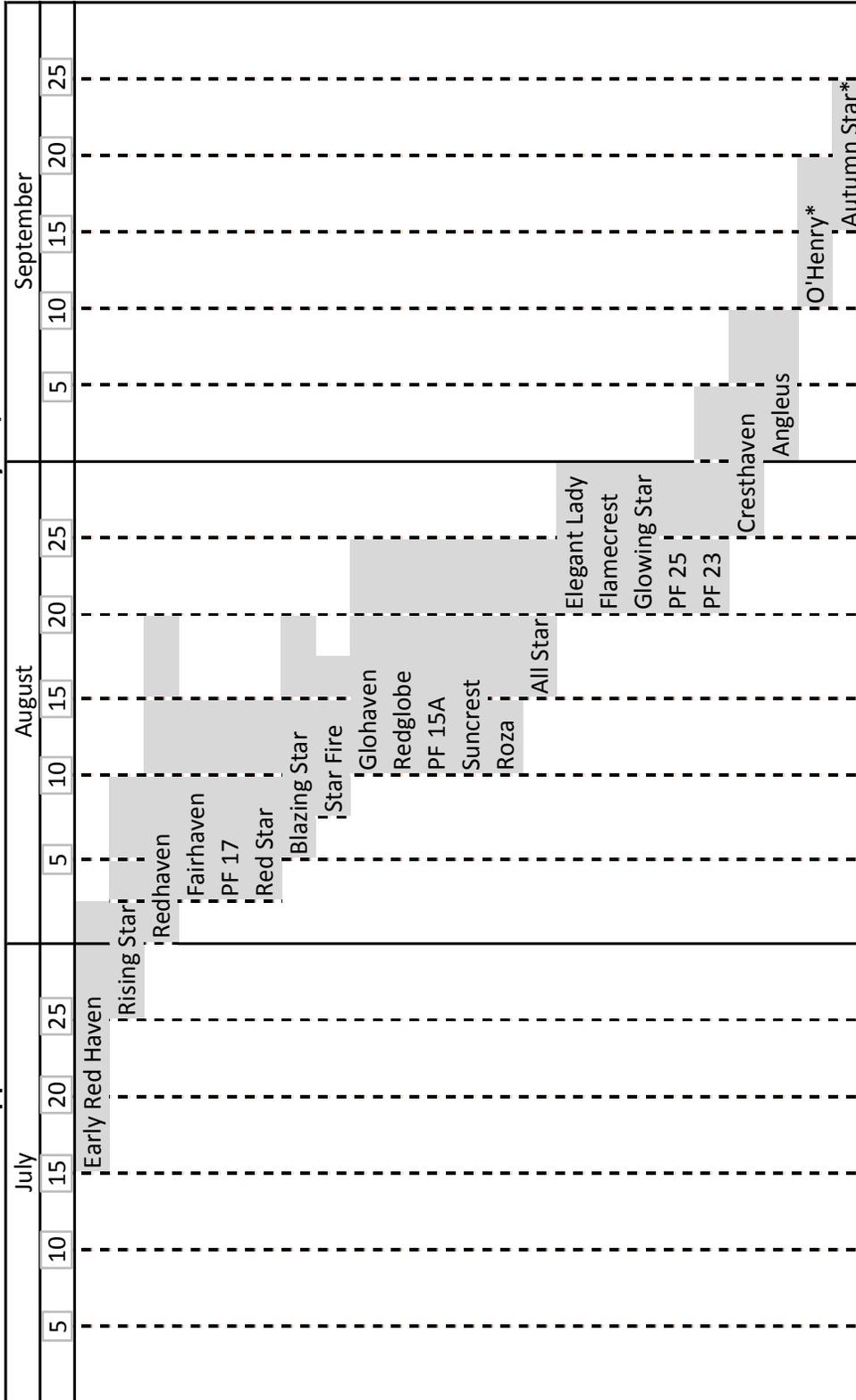
Varieties of nectarines that are being tried but are not fully evaluated, particularly in relation to hardiness, in the Okanagan areas include Independence, Fantasia, Flavortop, Earlisscarlet, and Harblaze.

Dark Sweet	Maturity (days +/- Van)	Ave. Fruit Weight (g)	*Firmness (Durometer)	Natural Cracking	Productivity	Habit	Fertility	Notes
Cherry Varieties Chelan™	-10-12	10.7	Firm / Med	Moderate	Moderate to High	More mod. branch angles than Bing	No	Good on Mazzard, incompatibility on Maheleb.
Cashmere	-9	Med.-Lrg	Mod.	Susceptible	High	Spreading	Yes	Compatibility on Rootstock other than Mazzard is unknown.
Tieton™	-5-7	12.0	Very Firm	Susceptible	High	Vigorous, similar branch angles to Bing	No	Tends to nose crack, Good on Gisela 5, unproductive on other rootstocks.
Santina	-6-8	9.5	69	36%	Very Low	Spreading to Weeping	Yes	Med. size fruit, responds well to GA, good choice for early market.
Sumpaca (Celeste™)	-6	10.7		18%	Low		Yes	stem short and fruit is Van like but not as blocky, lack of storage life.
Sumnue (Cristalina™)	-5-7	10.0	68	29%	High	Spreading	No	Glossy and attractive in a pack.
Sumele (Satin™)	-2	10.8	77	27%	High	Mod. Vigour, Spreading	No	Attractive pack, more info on fruit quality and market response needed.
Van	0	9.9	Mod.	45%	High		No	Fruit can be large, but become small on overloaded trees.
Bing	0	9.6	Mod.	40%	Low		No	Not commercial quality, very susceptible to rain splitting, yields not high.
Benton	+1		Firm	Less suscept. than Bing	Low	Vigorous	Yes	Susceptible to powdery mildew.
Sonnet	+2	12.4	67	17%	Very Low	Mod. Vigour	No	Large fruit, distinctive bright red blush, responds well to GA.
Sumste (Samba™)	+2	11.4	74	15%	Moderate to High	Upright and Spurry	No	Fruit are large with dark red, glossy skin.
Sandra Rose	+3-4	11.6	70	17%	Moderate to High	Spreading	Yes	Responds well to G.A. as firmness without is a concern, very good taste, and attractive in a pack.
Sumleta					High	Upright and	Yes	Fruit has a significant nose dimple,
(Sonata™)	+7	12.7	77	42%	Moderate to High	Spreading	No	making it susceptible to splitting.
Sylvia	+7	10.7		45%	High	Semi-Compact		Very thick stem holds up well in cold storage, tolerant to rain splitting and very tolerant to sun scalding.
Kordia (Attica)	+9	11.4	Very Firm	11%	High	Moderate	No	Origin Czech Republic, late bloom, sensitive to frost, heart shaped.

* A durometer measurement of 73 was determined to be "Just Right" in relation between firmness and perception.

Dark Sweet	Maturity (days +/- Van)	Ave. Fruit Weight (g)	*Firmness (Durometer)	Natural Cracking	Productivity	Habit	Fertility	Notes
Cherry Varieties								
Selah	+10	11-13	Firm	Like Bing	Moderate to High	Vigorous, similar branch angle to Bing	Yes	Selection from Prosser, WA.
Lapins	+11	10.6	76	22%	High	Vigorous, very upright	Yes	Susceptible to powdery mildew. Standard for mid-late season varieties, overcropping may be a problem in some years, upright habit can be a challenge.
Skeena	+11	11.4	80	26%	Moderate to High	Upright and Spreading	Yes	When compared to Lapins, Skeena fruit are slightly larger, firmer, with thicker stem and easier tree to manage.
Regina™	+15	10.7	Very Firm	Tolerant	Moderate		No	New variety from Germany.
Sweetheart	+21	9.9		21%	Very High	Spreading	Yes	Very precocious with heavy crops, overcropping may be an issue. Cherry is light red colour and susceptible to mildew
Symphony	+20	10.6	75	15%	Moderate to High	Upright	Yes	Tendency to fall from stem before or during harvest, recommended for stemless market only.
13S2009	+26	10.9	78	21%	High	Upright and Spreading	Yes	Good tolerance to rain induced cracking, flower hardness similar to, or better than Bing. Highly susceptible to mildew and can have mixed maturity problems.
(Staccato™)	+28	10.7	80	16%	Moderate	Mod. Vigour, Flat Branches	Yes	Fruit mod. Large, very firm, bright red skin.
13S2101	+30	10.3	82	17%	High	Mod. Vigour, Flat Branches	Yes	Fruit is very firm, crunchy and moderately sweet, exceptional habit.
(Sovereign™)								
SPC103								
(Sentennial™)								
Blush Type Cherry Varieties								
Rainier	+2-10	Large	Firm		Moderate to High	Vigorous, hardy and bears early	No	Multi-pick yellow cherry with red blush
13N0739	+7-9	12.2	78	34%	Moderate to High	Upright, Spreading	Yes	Large fruit, mod. Tolerance to cracking, skin can be slightly mottled.
13N0770	+12-15	11.5	76	29%	High	Upright, spreading, vigorous	Yes	Mild flavour, considered moderately sweet.
(Stardust™)	+22	10.4	77	16%	High	Vigorous and upright	Yes	Test only, fruit are firm, juicy, sweet, with good flavour. Percent and intensity of blush may be a concern.
SPC243								
* A durometer measurement of 73 was determined to be "Just Right" in relation between firmness and perception.								

Approximate Harvest Dates for Peach Varieties for Osoyoos/Oliver Area



* Limited market demand for peaches after September long weekend

Peach Varieties

Potential	Varieties	Harvest (+/- days Redhaven)	Colour	Shelf Life	Size	Productivity	Notes
yes	Redhaven	+0	Medium	Good	Med-Large	High	Standard peach planting, semi-clingstone.
yes	Blazing Star	+5	High	Good	Med-Large		Great colour, between Redhaven and Glohaven.
yes	Glohaven	+10	High	Excellent	Med-Large	Good	Nice colour, (slight purple), store well, low-fuz.
yes	Flamecrest	+20	High	Excellent	Med-Large	Good	Great colour, after halfway through Glohaven, low fuz.
yes	Elegant Lady	+20	High	Excellent	Large	Good	Gorgeous colour, 80-90% red, big size, good shipping, firm.
yes	PF 23	+25	High		Medium	High	Problem that people let them get over-ripe before picking), Don't plant past Oliver due to loss of colour and maturity issues.
yes	Angelus	+30	Medium	Excellent	Large	Low	Great size, light production (Tip bearer; needs to be pruned lighter), good shipper.
yes	O'Henry	+40	Medium	Excellent	Med-Large	High	Good size, store well, late peach, colour can sometimes be a problem, fruits on tips of the branches, self-fertile, limited market (peach market drops off after Sept. long weekend).
maybe	PF 17	+2	High			High	Split stones can be a problem.
maybe	Roza	+10					75% red, large, sweet peach.
maybe	PF 15A	+10	High	Good			
maybe	Suncrest	+10	Variable	Poor/Soft			Proper maturity, split stones can be a problem.
maybe	All Star	+12	High	Good	Med-Large		
maybe	Glowing Star	+20	High		Med-Large		
maybe	PF 25	+26	Good		Large	High	Will produce in marginal areas.
maybe	Autumn Star	+45					
no	Early Redhaven	-15	Medium	Poor/Soft	Small	Good	Small Size, split-stone/misshapen fruit a problem, semi-clingstone.
no	Harrowdiamond	-12	Low	Poor/Soft	Medium	Good	Need to pick fast or goes soft, doesn't store well, market resistance, mildew problems, semi-clingstone.
no	PF 1	-10	High	Poor/Soft	Small	Low	Soft, low storage life, low production, semi-clingstone.
no	Redstar	+0	High	Poor/Soft	Medium	High	Good colour, can be soft, split stones can be a problem, semi-clingstone.
no	Rising Star	+0			Small		
no	Fairhaven	+2	Low	Poor/Soft	Med-Large	Good	Bruise easily, market resistance.
no	Red Globe	+2	High				Split stones can be a problem.
no	Harbrite	+5	Low	Good-Poor	Med-Small	Good	Heavy fuzz, no colour.
no	PF 12	+10	High	Poor/Soft	Small	Low	Soft, low storage life, low production.
no	Starfire	+10	Medium	Poor/Soft		High	
no	Red Lady	+10	High	Excellent	Small		hard to tell maturity for picking.
no	Coralstar	+12	Medium	Poor/Soft	Med-Large		Split stones can be a problem.
no	Cresthaven	+20	Low	Good	Med-Large	Good	Late, Not enough colour.

Nectarine Varieties in order of harvest

Potential	Varieties	Shelf Life	Size	Productivity	Notes
no	Firebrite	short	small	heavy	split stones can be a problem
maybe	PF #11	excellent			claims good cold tolerance
no	Harblaze	short	med-large	Good	tends to soften quickly near maturity during final swell
maybe	Harflame	med	med	moderate	
yes	Sweet Scarlet				
no	Independence	short	small		tends to soften quickly
yes	Early Sungrand				
yes	Sunglo	excellent	med-large		
yes	Flavortop	med-exc	med-large	moderate	winter sensitive
yes	Redgold	excellent	med	Good	standard
yes	Supreme Red				
yes	Fantasia	med-exc	med-large	Good	

Approximate Harvest Dates for Nectarine Varieties for Osoyoos/Oliver Area

	August					September				
	5	10	15	20	25	5	10	15	20	25
Firebrite										
PF #11										
Harblaze										
Harflame										
Sweet Scarlet										
Independence										
Early Sungrand										
Sunglo										
Flavortop										
Redgold										
Supreme Red										
Fantasia										

POLLINATION

Proper pollination is essential for the economic production of tree fruits. Some tree fruits such as apples require cross pollination, that is, pollen from the anthers of flowers of one apple variety must be transferred to the stigmas of a different, compatible variety. Not all varieties are compatible. Inadequate pollination results in small crops of low quality fruit. Good pollination helps produce large crops of bigger, better shaped fruit resulting in higher sugar content. Storage qualities and flavor are also improved by proper pollination.

Pollination is a critical but very brief event in the production cycle of all tree fruits, **including self-fertile varieties**. Good conditions for pollination may exist for only a few hours during bloom.

Because of its importance, pollination should be planned and not left to chance.

Tree fruit pollen is heavy and sticky so wind plays a very minor role in its transfer between flowers. Insects are the primary agents in transferring pollen from flower to flower. **Honey bees are by far the most important pollinators of tree fruits because they are easily managed and are relatively abundant**. Wild bee populations fluctuate from year to year and cannot be relied upon to pollinate large monocultures, such as apple orchards.

There are two main requirements for planned cross pollination:

1. An adequate source of pollen of a compatible variety
2. A bee population large enough to meet the crop's pollination requirement at the time of bloom.

For a permanent source of pollen, plant the correct number and variety of pollinizer trees, or graft in pollinizer branches with the exception of crabapples. The use of pollen inserts, bouquets and hand applicators act only as stopgap methods.

Pollinizer Varieties

The pollinizer requirements of apple, pear, cherry and apricot plantings are often underestimated. Triploid apple varieties have sterile pollen and cannot be depended on as pollinizers of other apple varieties. Most apples, pears and cherries (except for self-fertile varieties) require pollinizers. Japanese

plums require a Japanese pollinizer and European plums require a European pollinizer. Early prune strains benefit from pollinizers if the bloom period is cool. In standard and semi-standard plantings pollinizer varieties should be interplanted, usually, as every third tree in every third row, or a maximum of 18 m from pollinizer to the main variety. It is frequently more convenient to plant every third or fourth row to a pollinizer variety. With Bartlett and Delicious more pollinizers are required. For high-density hedgerows, pollinizer varieties should be planted in the row with a maximum spacing of 15 m. Planting of pollinizers in adjacent rows should be staggered. For further details consult your crop management advisor.

Pollinizer Charts - *see following pages*

Sweet Cherry Bloom and Pollen Compatibility Chart

Compatibility Group (S-Alleles)	Early	Early Mid	Pollination Period Mid Season	Mid Late	Late
Group II S1S3	Sumste (Samba™)		Sumele (Satin™) Van	Sonnet, Sumnue (Cristalina™)	Regina™
Group III S3S4			Bing	Lambert	
Group VI S3S6				Kordia (Attika™)	
Group IX S1S4			Rainier	Sylvia	
Group XVI S3S9		Chelan™	Tieton™		
Self-fertile With-S4' (Universal Donors)		Lapins, Sweetheart	Celeste, Santina, Selah™, Staccato™, Stella, Symphony, SPC243, 13N0739	Benton, Cashmere, Sandra Rose™, Skeena™, Sumleta (Sonata™), SPC103 (Sentennial™), 13S2101 (Soveriegn™)	13N0770 (Stardust™)

When using the “Cherry Bloom and Pollen Compatibility Chart”, varieties within the horizontal rows will not pollinate one another, while the varieties in the vertical rows will pollinate each other.

Relative Apple Variety Full Bloom Chart (days)																									
	early blooming								mid-blooming							late blooming									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Summerland Crab#2																									
Sunrise																									
Silken																									
Makamik																									
Summerland Crab#3																									
Dolgo																									
Summerland Crab#4																									
Arlet																									
Orin*																									
McIntosh																									
Shamrock																									
Ginger Gold																									
Creston*																									
Empire																									
Mutsu*																									
Honeycrisp																									
Jonagold*																									
Golden Delicious																									
Elstar																									
Pink Lady																									
Summerland Crab#5																									
Manchurian																									
Winter Banana																									
Cameo																									
Red Delicious																									
8S6923 (Aurora Golden Gala™)																									
RubINETTE																									
Spartan																									
Ambrosia																									
Cox Orange PIPpen																									
Braeburn																									
Gala																									
Fiesta																									
Summerland Crab#6																									
Rome																									
Fuji																									
Newtown																									
Granny Smith																									
SPA440 (Nicola™)																									

*Triploid varieties, pollen is sterile

Managing Honeybees for Pollination

For apples, beehives must be moved in when the king blooms are opening, but not before. In low-density orchards, place two to three hives per hectare. High-density orchards with heavy bloom may require as many as five hives per hectare for optimum pollination.

Pears are less attractive to honeybees, requiring five hives per hectare. Move hives into the orchard when 30 to 50% of the blossoms are open.

Sweet cherries require three hives per hectare. Hives should be placed when the first 10% of the blossoms are open.

Do not keep beehives in orchards year round because insecticides will reduce bee populations or kill colonies. Also, bees placed in the orchards too early will find other attractive floral sources which they may continue to forage on, ignoring the fruit trees that begin to bloom.

Hives used as pollination units should meet the following conditions:

1. Have a laying queen.
2. Contain a bee population large enough to cover eight standard combs.
3. Have at least five standard combs covered with large areas of brood (immature stages of bees) or the equivalent of 0.5 m² of comb space occupied by brood.
4. Be free of American Foulbrood Disease and show little or no evidence of other diseases.
5. Contain a minimum of 4.5 kg of stored food other than pollen or the equivalent of two well-filled standard combs.

Any growers questioning the quality of their pollination units should contact their supplier to arrange for an inspection or arrange for a government inspection by contacting the Apiculture Program, BCMAL, Abbotsford (604-556-3129) for the nearest Apiary Inspector.

Planned pollination is an essential part of modern fruit culture and is a co-operative enterprise between beekeeper and orchardist. Consult your crop management advisor for names of beekeepers providing pollination services.

For more information on pollination, contact BCMAL Abbotsford office. Also visit BCMAL's website at www.al.gov.bc.ca/apiculture/ for reference material on the pollination process, the biology of bees, various crop requirements and the use of bees to achieve proper pollination.

Bee Poisoning

Honeybees are essential to ensure proper pollination in commercial orchards. Orchardists should take every precaution to avoid bee poisoning during pollination.

Honeybee poisoning seriously impacts both beekeepers and orchardists who depend on bees. Orchardists lose not only their investment in pollination rental fees when the bees are killed but more importantly, crop yield and quality may be reduced because of incomplete pollination. Honeybee poisoning is a result of exposure of foraging bees to pesticides applied to blossoms of fruit trees or cover crops in or near the orchard. Bees may also be poisoned by contaminated water sources or when flying through pesticide mists during applications.

Most orchardists do not spray their trees when in bloom and when beehives are on location. However, accidental poisoning can occur if the bees are foraging on neighboring blocks and vegetation. Honey bees may forage over one kilometer from the hive when the immediately surrounding vegetation does not offer attractive nectar and pollen food sources. Foraging bees carrying contaminated nectar and pollen back to their hives can destroy the hives or reduce their populations so much that no bees will be available for pollination.

Accidental poisonings are more likely to occur where various types of fruit or different varieties of the same fruit are grown in close proximity. It is not unusual for orchardists to apply pesticides to some trees while others are in bloom. For example, cherries or pears may require sprays after bloom while apples are still blooming. Because so many apple varieties are being grown, early varieties may require sprays while bees are nearby pollinating later blooming varieties. The table, **Relative Blossom Periods**, shows the relative length and overlap of blossom periods of common apple varieties and some crabapple pollinizers.

One way to reduce the risk of bee poisoning is by coordinating the placement and removal

dates among orchardists. Furthermore, neighboring orchardists should notify each other and their beekeepers before any pesticides toxic to bees are applied during pollination. If notified in time, beekeepers can confine the bees for a short time or move the hives out temporarily.

The use of IPM and organic fruit production practices greatly reduce the risk of bee poisonings.

Before applying any pesticides when trees or ground vegetation is in bloom, check the table Toxicity of Pesticides to Bees table for the comparative toxicities of pesticides and the length of their residual activities.

The following are additional precautions that will reduce the risk of bee poisoning.

1. DO NOT SPRAY ANY CHEMICAL INSECTICIDE IN ORCHARDS WHEN FRUIT BLOSSOMS ARE OPEN, or when spray drift may contaminate the open blossoms of adjacent orchards. Recommended blossom thinning sprays, fungicides, growth regulators and nutrient sprays are not hazardous to bees. However if applied while bees are actively foraging, the bees may be chilled, disoriented or repelled and crop pollination will cease. If possible, do not spray any pesticide during the pollination period.

2. Mow or beat down flowering cover crops on the orchard floor or at the perimeter of the orchard before applying insecticidal sprays to the (non-flowering) fruit trees.

3. Remove honeybee colonies after pollination is completed and before the spray program begins.

4. Some chemicals should be applied only in late evening, during the night or in the early morning while bees are not actively foraging (generally between 6 p.m. and 7 a.m.). Evening applications are generally less hazardous to bees than early morning applications. If high temperatures cause bees to start foraging earlier or continue later in the day than usual (before 7 a.m. or after 6 p.m.), shift application times accordingly.

5. Do not dump unused dusts or sprays where they might become a hazard to bees (and the environment). Bees may sometimes collect any type of fine dust material when pollen is not readily available. Under such conditions, pesticide dusts may be brought back to the colony where the entire population may be poisoned. Bees may also be

poisoned when drinking water from contaminated spray dumps.

6. Always select insecticides that are relatively non hazardous to bees whenever possible. Tests have consistently shown that dusts are more hazardous than sprays of the same insecticide. Emulsifiable (liquid) formulations usually have a shorter residual toxicity to bees than wettable powders (WP). Granular formulations are low in hazard to bees. Bees are temporarily inactivated by direct contact with oil sprays and some losses may occur.

7. Class I, II and III pesticides are hazardous to bees when applied on blooming vegetation on which bees are foraging. This includes cover crops on the orchard floor. Check the table **Toxicity of Pesticides to Bees** for the comparative toxicities of pesticides and the length of their residual activities. Sevin has an extremely long toxicity period to bees and remains hazardous even when applied as a thinning spray on apples 7 - 25 days after full bloom, if there is bloom in the cover crop.

8. Admire, Assail, Success and Malathion are hazardous to bees if applied in the early morning and throughout the day. Make applications during the late evening to reduce the hazard, except during periods of high evening temperatures or if morning dew is forecast (residues do not dry).

9. Admire and Success sprays are extremely toxic to foraging bees but the residues are not toxic once dry.

10. Thiodan[®] and Zolone are hazardous to bees if applied when bees are foraging. The hazard can be avoided if they are applied during early morning or late evening, except during periods of high temperatures at these times.

11. Ambush and Decis are extremely toxic when applied to foraging bees but their residual toxicities are very short, about 24 hours.

Toxicity of Pesticides to Bees

Pesticide	Toxicity to Bees	Residual Period	Use Class
acetamiprid (Assail)	Moderately high	3 hours (dried)	III
acequinocyl (Kanemite)	Low		IV
amitrole (Amitrol)	Relatively low		III
ivermectin (Agri-Mek)	Moderately high	1 – 3 days	II
azinphos-methyl (Guthion, Sniper) ☠	Very high	2.5 days	I
<i>Bacillus thuringiensis</i> (Dipel, Foray, Bioprotec)	Low	Nil	IV
bifenazate (Acramite)	Moderately high	< 8 hours (dried)	II
carbaryl (Sevin XLR Plus)	Moderately high	More than 1 day	II
clofentezine (Apollo)	Low	Nil	IV
chlorantraniliprole (Altacor)	Low		IV
clothianidin (Clutch)	Very High		I
deltamethrin (Decis)	Very high	3 - 4 hours	II
diazinon (Diazinon)	Very high	2 days	I
dicofol (Kelthane)	Very low	Less than 3 hrs	IV
dimethoate (Cygon, Lagon)	High	3 days	I
dodine (Equal)	Low		IV
endosulfan (Thiodan, Thionex) ☠	Very high	8 hours	III
formetanate hydrochloride (Carzol)	High	8 hours	II
horticultural oil	Low		IV
imidacloprid (Admire, Alias)	High	<8 hours (dried)	II
malathion (Malathion)	Very high	2 - 6 hours	II
methoxyfenozide (Intrepid)	Very Low	< 8 hours (dried)	IV
myclobutanil (Nova)	Low		IV
novaluron (Rimon)	Low	1 day	I
phosalone (Zolone)	Very high	2 hours	III
phosmet (Imidan)	High	1 - 4 days	I
pirimicarb (Pirimor)	Low	Less than 2 hrs	IV
pyridaben (Nexter)	Very high	<4 hours (dried)	I
simazine (Princep)	Low		IV
spinetoram (Delegate)	Very high		III
spinosad (Success, Entrust)	Very High	3 hours (dried)	III
spiroticlofen (Envidor)	High	1 day	I
Spirotetramat (Movento)	High		I
tebufenozide (Confirm)	Low	<8 hours	IV
thiacloprid (Calypso)	Low		IV
thiamethoxam (Actara)	Very high	5 days	I

Use Class: Appropriate Spray Timing

- I. Do NOT apply on blooming crops or weeds.
- II. Apply in evening after bees have stopped foraging (see Caution)
- III. Apply in late evening after bees have stopped foraging until early morning before they start foraging (see Caution)
- IV. Can be applied at any time with reasonable safety to bees.

Caution: Timing of insecticide applications in respect to bee poisoning hazard can be drastically modified by abnormal weather conditions. If temperatures are unusually low following treatment, residues on the crop may remain toxic to bees up to 20 times as long as during reasonably warm weather. Conversely, if abnormally high temperatures occur during late evening or early morning, bees may actively forage on the treated crop during these times. Morning dew can also make residues toxic to foraging bees.

Information Sources:

How to Reduce Bee Poisoning from Pesticides, PNW518, A Pacific Northwest Extension Publication (replaces WREP15), Washington State University (1999)

Handbook for Pesticide Applicators and Pesticide Dispensers,
Pesticide Control Branch, B.C. Ministry of Environment.