

The Bee Line

NEWSLETTER OF WESTERN CASCADE FRUIT SOCIETY

SUMMER 1995

Apples Pears Figs Grapes Kiwis Cherries Nectarines Peaches Plums Blackberries Raspberries Strawberries Blueberries Currents Huckleberries Gooseberries Nuts

**DON'T MISS THE
FALL FRUIT SHOW**
SATURDAY, OCTOBER 28
SUNDAY, OCTOBER 29

at
Edmonds Community College
200th Street SW and 68th Avenue W
Lynnwood, Washington

LOTS OF FREE PARKING

Admission: Adults \$3.00
Age 16 and under FREE

—APPLE TASTING—FRUIT IDENTIFIED—SPEAKERS—CIDER PRESS RAFFLE—
—CIDER PRESSING—FRUIT DISPLAYS—EXHIBITS—

PROGRAM DETAILS IN OCTOBER NEWSLETTER

ADDITIONAL DATES TO REMEMBER AND MAKE NOTE OF

| | |
|-------------------|---|
| July 8 | Mount Vernon—Cherry Harvest |
| July 22 | Plant Amnesty—Kubota Garden Tour and Celebrity Picnic 10:30 to 12:30 - \$25.00 donation |
| August 12 | Mount Vernon—Stone Fruit Harvest |
| August 20 | Summer Friends Day Brogdale Horticultural Trust, Faversham—11:30-4:00 - £4.95 for Coffee, Ploughman's Lunch and Tea - focus on plums |
| August 21 to 24 | NAFEX Conference Penticton, B.C. |
| September 8 to 24 | Puyallup Fair—WCFS Will Have an Educational Booth 10:00 a.m. - 10:00 p.m. |
| September 9 | Mount Vernon—Apple & Pear Harvest (early & mid-season) |
| September 24 | Autumn Friends Day Brogdale Horticultural Trust, Faversham—11:30-4:00 - £4.95 for Coffee, Ploughman's Lunch and Tea - focus on apples and pears |
| September 24 | Plant Amnesty's Annual Plant Sale—Center for Urban Horticulture 11:00 a.m. to 3:00 p.m. |
| September 30 | Mount Vernon Fall Field Day & Open House 8:30 a.m. to 3:00 p.m. |
| October 13 & 14 | State Master Gardeners Advance Training-Mount Vernon |
| October 14 | Mount Vernon—Apple & Pear Harvest (late season) |
| October 14 & 15 | University of British Columbia Apple Fest, Vancouver B.C. |
| October 21 & 22 | Home Orchard Society All About Fruit Show, Clackamas Co. Fairgrounds, Canby, OR |
| October 28 & 29 | WCFS FALL FRUIT SHOW |

NEWS FROM THE BOARD ROOM

The WCFS Board met June 17 at the Swasey Library in Tacoma, chaired by Joe Zeppa, Chairman of the Executive Committee.

Dick Tilbury reported for the Executive Committee on the roles and responsibility of WCFS Directors and Officers proposed at previous meetings of that committee. The responsibility does not mean that director or officer has to DO it, just that it gets done, either by a volunteer or assignment. Below are the assignments. The empty spaces mean a volunteer is needed to fill that job. Lead Person is the person who will do the task, Team Member describes volunteers willing to help.

| RESPONSIBILITY | BOARD POSITION | BOARD MEMBER | LEAD PERSON | TEAM MEMBERS |
|-----------------------------|------------------|--------------------|--|----------------------------------|
| Fall Fruit Show | President | Joe Zeppa | Joe Zeppa | |
| Spring Event | Vice President | | | |
| Event Site Selection/FFS | President | Joe Zeppa | Orel Vallen | |
| Event Site Selection/Spring | Vice President | | Orel Vallen | |
| Event Setup/Breakdown | Pres & Vice Pres | Joe Zeppa & | Orel Vallen | |
| Northwest Flower Show | STFS Chapter | Marlene Falkenbury | Marlene Falkenbury | |
| Puyallup Fair | Tahoma Chapter | Leonard Jessen | Leonard Jessen | |
| Ticket Selling/FFS | Treasurer | Evelyn Hoyme | Ray Elder | |
| Raffle | Treasurer | Evelyn Hoyme | Marlene Falkenbury | |
| Legal/Tax | Treasurer | Evelyn Hoyme | Chuck Parkman & Chuck Holland | |
| Membership | Treasurer | Evelyn Hoyme | Evelyn Hoyme | |
| Newsletter Editor | Secretary | Chuck Holland | Evelyn Hoyme | |
| Commercial Displays | Director 1 | Larry Barelo | Chuck Parkman | |
| Food Service | Director 1 | Larry Barelo | Marlene Falkenbury | |
| Scionwood Sales | Director 2 | Bill Davis | Bill Davis | |
| Education (displays, etc) | Director 3 | Dick Tilbury | Dick Tilbury | |
| Event Speakers | Director 3 | Dick Tilbury | Chuck Parkman | |
| Fruit Tasting | Director 4 | Orel Vallen | Bill Davis | |
| Fruit ID | Director 4 | Orel Vallen | Orel Vallen | |
| Cider Press | Director 4 | Orel Vallen | Ron Schaevita | |
| Chapter Liaison | Director 5 | Ernie Mazzei | Ernie Mazzei | |
| Nominating Committee | Director 6 | Gil Scheiber | Joe Zeppa | |
| Recruiting | Director 6 | Gil Scheiber | | |
| Rootstock Sales | Director 7 | Steve Jackson | Steve Jackson | |
| Publicity | Director 8 | | Comm: T.K. Panni, Dick Tilbury, Joe Z. | Phyllis Nelson & Sally Mussetter |
| Research Grants/WWTFRF | Director 9 | T.K. Panni | T. K. Panni | |
| Outreach | Director 9 | T.K. Panni | | |

The Treasurer reported that in order to file the Annual Report with the Secretary of State WCFS must have a president. Joe Zeppa was elected President, Chuck Holland Secretary. The office of Vice President is still vacant, and Board Director 8 needs to be filled. Please contact Joe if you are interested in serving on the board.

A donation of \$1500.00 for research at Mount Vernon was approved.

Julie Hubner of the Skagit County Master Gardeners gave a presentation of the proposed layout for a demonstration garden on property at Mount Vernon Research Station. WCFS is invited to develop a demonstration home orchard there. The area available to us, a bit more than an acre, is located behind the buildings, south of the area the Master Gardeners would develop and out of view of the highway.

Other groups expressing an interest in having a demonstration area, to the northwest of the MG plot, are the American Rhododendron Society, Northwest Chapter of the Native Plant Society, the Dahlia Society, the Iris Society and the Skagit Men's Garden Club. The demonstration gardens would be administered by a Board consisting of a representative from each group with Wilbur Anderson, manager of the Research Station, as chairman. It is jointly recognized that these demonstration areas would be mutually beneficial to everyone involved; greater community awareness of the research

station and the Western Cascade Fruit Society, Master Gardeners program and the other special interest groups. Gary Moulton is quite enthusiastic about WCFS participation.

The Master Gardeners have designed their demonstration garden, but will not be putting it into development until mid 1996, which would give the other organizations time to organize (as WCFS would need to do) and plan.

The Board voted to proceed with the demonstration orchard. Ernie Mazzei will work to initiate a chapter of WCFS in that area to plan, plant and manage the orchard. Those of you who live in that area will be invited to meet with him to talk about forming a chapter. If you are interested, give Ernie a call to save him some time. Of course, anyone from WCFS would be welcome to help get it going, call Ernie, he'll be happy to hear from you.

Chuck Holland reported on his research of WCFS liability. There are two choices available: increase our liability coverage, at a cost of about \$500.00; or discontinue the high liability (the E. coli possibility) cider pressing of apples. The Board voted to discontinue pressing apples for the general public as a feature at the 1995 Fall Fruit Show. We will have cider available to the public from apples whose source is known.

FALL FRUIT SHOW 1995

Your help is needed at the show in various areas. Setting up Friday evening and/or taking down Sunday, selling raffle tickets, selling admission tickets at the door, at the membership table, educational table, tasting table. Contact to help:

| | | |
|---------------------------|--------------------|----------|
| Set up and /or take down | Orel Vallen | 772-2119 |
| Tasting table | Bill Davis | 771-8978 |
| Selling raffle tickets | Marlene Falkenbury | 522-2273 |
| Educational table | Dick Tilbury | 723-9009 |
| Membership table | Evelyn Hoyme | 485-3835 |
| Selling admission tickets | Ray Elder | 364-4872 |

In case you didn't call first and you receive a call for help from one of these chairpersons, say yes.

Now is the time to start thinking about submitting fruit for display at the Fall Fruit Show October 28 and 29, a major feature of this show. The following instructions may help you plan your contribution. Prepare a 3" x 5" card for each sample of three to five fruits with the variety name and other information you may wish to share. This could include harvest date and other pertinent data. If you are submitting more than one kind, they can be arranged alphabetically. Prepare a larger sign with your name and the geographical growing area. Plates, which hold three to five specimen, will be provided. After harvest the fruit will need to be refrigerated to store successfully. If you can, it would be nice to have some fruit for the tasting display. More details in the October newsletter.

The Fall Fruit Show will again have those ever popular apple identification experts to name your mystery apple. You should select fruit that is typical in color, size and shape for the tree you are trying to identify. Four to six specimen with the stem, if possible, are desirable. If you do not have that many, bring what you can, **DO NOT WASH OR POLISH**. Refrigerate the fruit in a plastic bag if it has to be stored for more than one week. You may be asked:

- When was the fruit picked?
- Is it from a single tree or a row of trees?
- Is it from an old orchard or a new planting?
- How well does the fruit keep?
- Is the tree upright, spreading or willowy?
- Does it bear on the shoot tips?
- Is it damaged by scab or mildew?
- Is it good fresh? Is it good cooked?

You may also be asked to leave your name and address with the fruit so you can be contacted later if necessary.

CHAPTER LIAISON—DIRECTOR 5 AS PERCEIVED BY ERNIE MAZZEI

As Chapter Liaison my role, as I see it, would be to promote several things. Such as goodwill, information not in the newsletter, encouragement, photography, and gather first hand what the chapters are doing and share that with others. I would then set up my calendar as to which meetings I could possibly attend. I know the easiest way to pass on information is for all the chapters to send news items directly to the newsletter editor. Most are reluctant to do so, however. I will try to fill this gap until they no longer welcome me as a visitor.

Ed's Note: Ernie's address and phone number are listed on page 27

1995 MOUNT VERNON HARVEST TOUR SCHEDULE

Sponsored by
Washington State University
Western Washington Tree Fruit Research Foundation

Our thanks to Jackie King for providing us with the following information for this season's schedule and procedures:

Starting with this season, some changes have been made in how the field tours will be conducted, in response to members' suggestions as a result of some problems encountered at last year's events.

Procedures for 1995 Season:

1. All members can participate in harvest days, but no unauthorized (personal) vehicles will be allowed in the field. Transportation to the orchards will be provided by WSU tractor and wagons.
2. Bags for harvest will be provided at the station by WWTFRF; other containers will not be taken into the field.
3. Each membership entitles the holder (individual or family) to one free bag at the harvest day, additional bags can be bought for \$5.00 per bag, if more fruit is available.
4. Size of bag will be regulated by the crop (e.g. apple bags larger than cherry bags) but the rule in #3 will be the same regardless of bag sizes.
5. Harvest days will be scheduled separately from any public open house or field day; admission to public open house or field day will not include any harvesting.

11:00 - 11:30 Meet in station parking lot, brief introduction to fruits in season, pick up harvest bags.

11:30 - 2:00 Tour of fruiting orchards. If you wish, bring along a picnic lunch to eat in the field.

Specimens available for sampling on any given date will depend on the harvest ripeness of each individual variety and cannot be determined in advance. Due to frost at bloom time, there will be no apricots to harvest in 1995. The monthly schedule will be:

| | |
|-------------|---|
| July 8 | Cherries—may be rather sparse this year |
| August 12 | Peaches, Nectarines, Plums—early plums were frost damaged |
| September 9 | Pears and Apples (early-mid season) |
| October 14 | Pears and Apples (late harvest) |

VOLUNTEERS NEEDED TO HELP

If you can come to the station on a regular basis, perhaps once a week, you can be a big help. Call Jacky King, (360) 424-6121, to volunteer to help with the ongoing work. The work in the field is very educational and there is work to be done that can be done by fit retired people. Work needed this summer includes netting and harvesting. (Could be a little late for netting by the time this reaches you, but Jackie is sure to have something equally important that needs doing.)

Editor's note: The changes in procedure were prompted by lack of control in the orchards with so many vehicles in the field. Some harvesters were picking fruit from trees that were flagged so as not to be harvested. (They probably arrived late and didn't hear the welcoming talk and discussion on what trees to harvest.) And some harvesters were taking so much that latecomers had nothing left to pick.

So, be on time, be considerate and have a good time.

COX'S ORANGE PIPPIN
AT HOME IN BOW
by Joseph C. Hoffman Olde English Orchards

I grew up in England and took the Cox's Orange Pippin for granted. All of us remember with pleasure the tastes and treats of our childhood, but after twenty years in the States - New York, Virginia, Georgia, California - nowhere could I find an apple with the flavor I remembered. Red Delicious, Granny Smith, Golden were forgotten soon after the first bite. But as I searched the stores and highway fruit stands I remembered the apple we found as kids after rambling down country lanes for miles to the edge of the little river where our favorite tree hung over a tall privet hedge down almost to the ground; and the old couple on the other side (*ancient* to our young eyes) seemingly oblivious to our urgent tugging and theatrical whispering.

Years later - in California - I found time to grow it. It was a disaster. I called an experienced orchardist. He told me he had a Cox "somewhere." So we searched one hot dry afternoon among hundreds of acres of Granny Smiths and Fuji until we came upon it, standing alone and forlorn against a barbed wire fence, with one or two sad apples red as beetroot, baking in 100 degrees of San Joaquin heat.

"Just thought I'd give it a try," he offered. "They like 'em in Europe but no one wants 'em here." I shouldn't wonder, I mused.

The Cox's Orange Pippin has been called the "finest apple in the world." Filled with complex flavors, it is as hard to describe as a fine Chardonnay (which it resembles in many ways.) It retains its remarkable flavors and shape in the oven and so makes the most unbelievable pies.

I began to make systematic inquiries. The apple had been grown in central Washington and the interior of British Columbia in the early part of the century, but had failed commercially a University of Washington horticulturist told me.

Why? "They just didn't do well." I was told. In Nova Scotia (similar marine latitude) they told me they produced some Cox, but the weather all but ruined them.

So I examined the two areas of the world where they flourish. After long discussions with growers and researchers there I came away with an excited conviction. Cox had not grown well in North America because no one had tried to develop it in the only conditions they tolerate: those that exist in Holland and England.

So I searched the weather maps of North America for conditions identical to theirs - nasty rainy winters and clammy cool summers we had complained so much about in England. To my delight, in all that vast continent, I found a single spot called Mount Vernon, Washington, which fit all of the criteria. Excitedly I telephoned from my home in California to the University Extension at Mount Vernon where my call was answered by a Mr. Gary Moulton.

"Do you know," I proclaimed, "The weather you fellahs get up there is identical to Holland's?" Rather patiently, he pointed out (as if to a Martian) that "We *export* more bulbs than are grown in Holland. And, moreover, there is a large Dutch contingent here."

I knew I had hit pay dirt. I announced my retirement and headed north. After long discussions with Gary and local growers, and long calls to Holland and England to experts there, I took the final plunge. In 1994 I planted a serene thirty acres next to the Puget Sound near Mount Vernon, Washington. Within a mere five months the Dutch Cox (Queen strain on M9 rootstock/Golden or Zoote Aacht interstem) produced enough delicious apples to spread among a large and appreciative audience. Though obviously immature, they had the flavor I remembered and they sold out quickly.

Experts would have allowed the first crop to fall on the ground since it is usually imperfect: some of the apples are misshapen or soft and tend to have storage defects. But I was impatient: I was perhaps forty years late, and nothing could allow me to keep my project under wraps another year. The question "Can Cox be grown commercially in America" has been answered, "Yes." But Cox is a very difficult apple to grow well, the professionals in Europe tell me. I am no expert, but I hope that enthusiasm and energy combined with the generous help of local apple growers and European well-wishers will make up for the knowledge gap while I race to fill in the void - in my understanding and in the American consumer's choice for fine apples.

Joseph Hoffman joined WCFS and the Seattle Tree Fruit Society chapter in March, 1995. Olde England Orchards is at 1464 Allen West Road, Bow, Washington. Our thanks for his contribution to *The Bee Line*. We expect to see some displayed at the 1995 Fall Fruit Show, and hopefully some for tasting.

UNDERSTANDING FRUIT TREE TRAINING

Dr. Curt R. Rom

Horticulturist, University of Arkansas

Introduction

Three of fruit growing's most exciting pleasures are establishing new trees, harvesting fresh fruit, and depositing earned income (home orchardists can translate that last pleasure as the thanks of friends and family for the gift of fruit-Ed. note). Fruit growers know the three are closely related and significantly intertwined.

When a tree is planted a new hope is sown. The productivity of the tree will depend upon the site, the selection of genetic material in the rootstock and scion, the management and care of the tree, and fortuitous environmental conditions. The burden of making the tree a success is upon the grower. The orchardist must understand the tree; how to manipulate it and how it will respond. The manipulation of the tree is a system, the tree training system. Tree training should be done to accomplish the management objectives of the orchard operation such as early, high production, yield quality fruit development, and labor efficiency. Understanding why the tree behaves in response to its management is critical to maximizing its performance.

This paper presents some aspects of tree training to help growers become better tree managers and thus enable them to enjoy the pleasures of fruit production.

TREE TRAINING PHYSIOLOGY

The basis of tree training is that the tree responds to being physically manipulated. The causes, or physiology, of the response are an interrelated series of processes. Some important factors of tree training are light and carbohydrate physiology, and plant hormone physiology.

Light - Fruit trees require light for photosynthesis (the production of carbohydrates from carbon dioxide with sunlight as the energy input), photomorphogenesis (the development of tissues and organs in response to light), phototropisms (the direction of growth in response to light), and photoperiodism (the response to day length). A good question is how much light is needed by fruit trees.

Light interception, the light striking the leaf canopy and not the orchard floor, has been related to orchard productivity in young orchards in Washington State, and in high density orchards in England and the Netherlands. On a per acre basis it has been estimated that mature trees should intercept approximately 70% of the total incoming sunlight. This is partially limited by the fact that orchards need a row space to move equipment and labor.

Light interception is increased by increasing planting density (reducing within row and between row spacing). To accomplish this, dwarfing rootstocks must be used. Some growers have tried 2, 3 and multiple-row beds. However, in beds with 3 or more trees, the center row is often shaded and produces less fruit and fruit of poor quality. Attempts to increase light interception above 80% have met with problems of light distribution or shading in the trees. As a result there is a reduction in fruit yield and quality. When orchard systems intercept less than 50 or 60% of incoming light, the light is wasted and the orchard is inefficient and low yield. Tree training and orchard systems are specifically developed to achieve the appropriate amount of light interception.

Once intercepted by a tree, leaves require about 30-50% full sunlight for maximum photosynthetic rate. Leaves will photosynthesize in only about 5% light but the process is inefficient. Interestingly, flower bud development and fruit set also require a minimum of 30% full and within-tree shade can limit fruit development. Developing buds need light in the middle third of the season. After bloom, developing fruitlets require light for early growth and shade results in fruitlet drop. Several studies have indicated that early in the season, fruit trees can have excessive shade in the middle of the canopies and thus limited flower development and fruit set. Red fruit color is dependent upon the light for several reasons; the color pigments require carbohydrates for their construction, and light shining upon the fruit surface is needed for the pigment formation. Red apples require about 70 to 80% full sunlight for maximum surface area color development and red color intensity. Green apples, such as Granny Smith, require approximately 70-80% full sun exposure for maximum color. Below or above this light level, the green color pigment (chlorophyll) is reduced. About 70% full sun is needed in the direct vicinity of the fruits for maximum fruit soluble solids development. Light for color and soluble solids development is needed in the last third of the season. Heavy shading must be prevented by proper limb positioning, pruning and summer pruning to maximize fruit quality.

Thus, for maximum yield the entire fruit tree canopy needs between 30 and 70% full sun; less than 30% is detrimental and more than 70% is not necessary. Many of the elements of tree training are practiced specifically to improve light distribution within the tree. The goal of tree training is to maximize light interception early in the life of the orchard and

early each season. Similarly, tree training should maximize light penetration and distribution within the canopy, preventing within-canopy shade.

Plant Growth Regulators - All living tissues in fruit trees produce and react to internal growth regulators or hormones. The hormones of interest are auxins, gibberellins, cytokinins, and ethylene. Auxins are produced in meristematic tissues such as shoot tips, developing leaves, cambial regions, and developing seeds. Auxins move downward in the plant with gravity and have roles in fruit retention lateral shoot bud break and root development. They are important in apical dominance; the control of growth of a shoot or limb by the tip of the branch (e.g. on a vigorously growing vertical shoot, there is limited bud break below the terminal). Gibberellins are produced in seeds and developing leaves, then transported where they are functional in cell expansion and inhibiting flower bud development. Cytokinins are produced in the roots and move upward with the water stream in the plant. Cytokinins are important in cell division and thus have roles in bud break, shoot elongation, and fruit size. Ethylene is a gaseous hormone released after injury to plant tissues or as part of the aging and senescence process. Typically, it is not the concentration of a single hormone that causes a plant response but a specific balance among the hormones.

ELEMENTS OF TREE TRAINING

Fruit tree training is the composite of several activities in the orchard which extend throughout the life of the tree and is not a single activity at one point in time. Tree training can be discussed as the elements: 1) genetics (the rootstock and cultivar), 2) tree shape and structure, 3) tree support, 4) limb bending, positioning, and angle, 5) pruning, 6) cropping, 7) tree nutrition, 8) tree water management, 9) use of growth regulators, and 10) miscellaneous training such as root restriction, girdling, etc.

Rootstocks and Cultivars

Selecting a fruit tree rootstock and cultivar is a most critical element in training and that which has the most long term effects. Although it may be possible to change a cultivar after planting, it may not be practical or economical. It is very difficult if not impossible to change rootstock or interstock. Therefore, making these decisions requires thorough thought and proper planning. The selection of rootstock and cultivar will determine the orchard planting density, precocity, tree support, required limb positioning and proper angle, and other management care.

Rootstocks are a critical component of the tree training system affecting tree adaptability to soils and tolerance of soil stresses, (i.e. flooding and drought). Rootstocks also control tree size, precocity, and productive potential. The amount of size control imparted by the rootstock affects planting density (trees/acre), the necessity of tree support, amount of support needed for the crop load, amount of pruning requirements, and other management activities such as thinning, harvesting and pest control spraying. Growers should become familiar with rootstocks prior to their use in a system by visiting experimental farms, experimental stations, or conducting their own limited trials.

Rootstock management can modify tree growth and performance and subsequent tree training. Typically, the degree of size control imparted by a rootstock increases with the amount of the exposed rootstock shank above the soil. Some rootstocks form burr knots in aerial exposed shanks. The burr knots are caused by a proliferation of root initials forming at old leaf scars or buds and are characteristic of some stocks. Burr knots may enlarge and cause disruption of the conductive tissue of the tree causing uneven tree growth and cropping and may ultimately functionally girdle the tree. Deep planting of the rootstock shank may provide better tree stability. But, if the graft union of the tree is planted below the soil line, the scion may form roots and the size controlling nature and precocious character of the rootstock may be lost. If the height of the graft union above the soil line varies within the orchard, so will tree height, spread and cropping. With dwarfing rootstocks uniform planting depth is required for uniform tree growth and optimizing tree training.

Trees with dwarfing interstocks (interstems) are often characterized by a degree of size control, precocity and lateral branch formation with naturally wide angles. The amount of dwarfing imposed by an interstock is characteristic of the clonal material used and the length of the interstem piece. Generally, as interstem piece increases, tree size will be reduced. Large variation in interstem length will result in a lack of tree growth uniformity.

Dwarfing caused by rootstocks is not completely understood. It is thought that the dwarfing rootstocks are genetically programmed to degrade auxin produced in the top of the tree and transported to the roots. As a result of reduced auxin, root growth is restricted and subsequently root produced cytokinins are reduced. The reduction of cytokinins transported to the top of the tree will reduce canopy growth and development.

The cause of precocity caused by dwarfing rootstocks is also not well understood. Recently, we have observed that shoots of trees on different rootstock grow at similar rates but have different duration of growth. Interestingly, those that stopped growing earlier in the season had higher bloom density and high yield efficiency (yield/trunk diameter). Thus, there was a good correlation between dwarfness and flowering and yield.

Each scion cultivar also has its specific growth habit, bearing pattern and ultimate maximum size. The growth habit of cultivars can be grouped as spur types, non spur types, terminal bearers and intermediates. Regardless of the growth habit, cultivar can influence tree size on any given rootstock. Some scion cultivars form lateral branches readily with wide crotch angles (e.g. Gala, Jonagold) while others may have limited lateral branching, shorter lateral shoots and form a large number of spurs (e.g. Redchief Delicious). Different tree growth habits will greatly influence the need for limb positioning and pruning to stimulate lateral growth. Along with selecting the scion cultivar for its fruit quality characteristics, the orchardist should also consider its growth habit as it will impact the necessity for support, pruning, crop load, etc.

The combination of scion and rootstock for size and precocity are additive. When a dwarfing rootstock is used for a spur type scion, trees can "runt out" or stop growing prior to filling their allotted space. Similarly, a precocious scion with a precocious rootstock may lead to over production and related problems such as small fruit size or biennial bearing. Careful attention to thinning is necessary.

Orchard Design and Planting

The objectives of orchard design and planting configuration should be to maximize light interception during each day, during the season, and over the life of the orchard, to optimize equipment and labor movement, and to avoid problems with either soil erosion or limited air drainage and frost pocket formation. Traffic movement is a physical management decision and should facilitate worker and vehicle access to the tree. Typically orchards planted on slopes are planted with the rows running down the slope to facilitate air drainage during radiational/convectional frost events. Thereby, cold-air buildup in the orchard causing frost injury to blossoms would be limited. In areas where slope exceeds 6% and heavy rainfall occurs at times, however, soils may be prone to erosion. Orchard rows may, therefore, be planted on a contour to prevent erosion and to allow better traffic along the contours instead of up and down hills.

The orchard row direction has an impact on light interception by the orchard and light penetration inside of the trees. Research in East Malling, England, indicated that in northern latitudes (>51° N) light interception by tree canopies and penetration within the canopies was greater in north-south rows than east-west rows during the equinox (flower initiation period) regardless of row spacing. However, as the sun lowers in the horizon during the fall equinox, light interception was not significantly less by east-west rows. Rows spaced 2 m apart had similar light penetration within the canopy regardless of row direction, however, in rows 3 m apart, east-west rows had less between row shading and thus better canopy light penetration than north-south rows. However, row direction had less of an impact on light interception and distribution than did canopy height and between row spacing.

Studies in Oregon and Arkansas have shown that the north side of east-west rows had reduced yield, possibly due to both smaller and fewer fruit. Research in Arkansas has shown that light in the lower half of the north side of canopies does not exceed 30% full sun either at mid or later summer.

Between tree shading occurs when trees are planted too close together either in the row or between rows given their height. The within tree shading is caused by canopies that are either too tall or wide to allow adequate light penetration. Light decreases exponentially from the top or side of canopies into the bottom or center. Estimates made from large tree canopies of a spur-type 'Delicious' at a height of between 4 and 5 meters tall and wide have light limited at between 1 and 2 meters deep within the canopy. Computer and mathematical models used in England have indicated that the maximum light penetration within an apple tree canopy (94% of canopy > than 30% full sun) occurs on the summer solstice (21-June) and decrease until the autumnal equinox (21-September: 78% of canopy > 30% full sun). These estimates can be used to estimate tree size with a given light level and leaf area density. However, if training systems, tree shapes or cultivars are used which have more loosely arranged leaves (lower leaf density), thinner canopies, or more clumped leaves, tree height and width can be extended beyond the limits discussed above. Because a portion of shading problems in orchard is caused by between tree shade and across-row shade, various estimates have been made to estimate tree height and row width. Research in New York indicated that tree height should be 1.5 to 2 times higher than drive-row width.

Thus, it is essential to plant orchards and train individual trees to minimize the within and between tree shading effects. A higher canopy during the flower initiation period would be advantages to fruit production.

Tree Support System

Two general categories of tree support are used in most modern orchard systems. These are 1) free standing trees where the tree trunk provides the vertical support and limbs provide the crop bearing support and 2) mechanical support where a post, or trellis system substitute for the tree framework and are provided by the orchardist to carry the weight of the tree and crop.

Depending upon the rootstock/scion combination, tree quality at planting, and the training system used, trees may require different levels of support; trunk support of 1 m height (3 ft), complete central leader support of a post or pole 1.75 - 3 m (5-10 ft), or whole tree support of a pole, post or trellis. The mechanical support provides additional training advantages of a system to tie limbs into proper position to encourage fruiting or support limbs carrying a large crop without limb breakage.

Short trunk support (1 m height) will reduce tree leaning, blow-overs from brittle roots, and breakage at the graft union. These supports can often be removed when the tree is mature although it is often necessary they remain in place. Short trunk supports have limited affect on tree growth and production. The use of tall supports (1.5-3 m height) to which the central leader is tied or attached or whole tree support allows the central leader to grow rapidly upwards, provides protection from wind movement, prevents tree leaning, blow-overs and graft union breakage and allows the tree to crop early in its orchard life. This is a distinct advantage of support compared to nonsupported trees and can help in the economic return of the cost of the support system.

Dwarfing rootstocks require tree support. Some rootstocks have brittle roots (e.g. M.9 or M.26) and/or brittle graft unions (M.26 or Mark). Precocious and productive rootstocks, producing fruit during the first or second year in the orchard and great fruit weights per tree need a support system to carry the crop load, keep the central leader upright, and prevent tree leaning. Trees which do not anchor well (M.9, M.7, Ottawa 3) may require stakes in heavy soils to prevent leaning.

Supporting a tree with a post, pole or wires has several impacts on the tree. Most notable, the reduction on movement and vibration from wind or load stresses from the crop load will reduce the secondary thickening of the trunk xylem and result in trees of smaller diameter. Studies have shown that staked trees grow 15-25% taller and have 20-50% smaller trunks. Staked trees may have more and longer branches, With increased canopy development, light interception and thus cropping will be increased.

The possible physiological cause of the increase in trunk diameter due to movement is the production of the gaseous plant hormone ethylene. The hormone is typically produced in response to wounds or stresses. Movement and vibration caused by wind or loads cause minute damage to cells and trunk tissue. Consequently, ethylene is produced and in response cell wall development and thickening occurs. Studies have demonstrated that applying ethylene generating chemicals will cause an increase in stem and trunk diameter when applied to plants.

Staking may influence root growth as well as the aerial portions of the tree. Research with landscape trees indicates that supported trees develop smaller root systems. Conversely, reducing wind movement of the tree during tree establishment may encourage new root development along the rootstock. Trees which have been high budded in the nursery and have a shank extending 10-20 cm (5-10 inches) when planted with the bud union 2-5 cm above the ground, will need to develop new lateral roots along the shank.

Wind movement during the first or second season in the orchard may cause the tree to form a v-shaped well and shank root development is inhibited. Spur cultivars reduce early root establishment along the rootstock shank and accentuate the problem. Although conclusive data is not available, it is believed that staking, thereby reducing wind movement and welling around the shank, may improve shank root development and allow early root establishment.

Tree support is necessary at early planting for early tree training and maximum growth and cropping response. Support allows the tree to attain its maximum allowed size rapidly and form branches without the need for pruning. No advantage is apparent for delaying the installation of a support system. Trees or orchard systems requiring support should have them in place with the tree at the time of planting. The length of time that tree support is necessary is not clear. In some cases, they can be removed when the tree has filled its space. However, with some rootstocks and in some training systems, the support remains for the life of the orchard.

Limb Bending and Positioning

Limb positioning is done as a part of training in order to control vegetative growth, encourage flower formation and cropping, allow for light penetration into the interior of the canopy and direct growth for balance around the tree. Limb angles relate to the structural strength of the tree. Narrow limb crotch angles are structurally weak and often have bark inclusions resulting in wind limb breakage, pest infestation and trunk winter injury can occur.

Each cultivar has a characteristic natural limb angle. Likewise, each growth habit requires a different degree of bending to maximize cropping. Regardless of growth habit, as limbs are bent or repositioned from a vertical, upright orientation to a more horizontal orientation, terminal extension growth is reduced, apical dominance is reduced and lateral branch development is increased. Spur and flower density increases on angled or horizontal limbs compared to vertical limbs.

Limbs can be bent or positioned in 2 forms. First, the entire limb axis is repositioned to the same angle. This result is a uniform growth response along the length of the limb. The second bending is an arc bending, where the tip of the limb is bent below some point along the limb forming an arched or curved limb. Arching limbs has a different response than straight axis positioning. At the highest point along the arch a shoot will typically form. It will be the longest branch along the limb and branch length will decrease in both directions from the apex of the arch towards the trunk or the limb tip. Elongation of the limb terminal will typically completely stop if the terminal bud is lower than other points along the limb.

Spur type cultivars (e.g. spur type Delicious) require positioning of 45°-60° from the vertical for maximum balance of spur formation and lateral shoot growth. Bending limbs below 60° will result in vigorous upright shoot (waterspout) formation. Limbs bent only 30° from the vertical will not adequately form lateral shoots but only spurs will form at each node.

Naturally branching cultivars (e.g. Golden Delicious, Jonagold, Gala) will develop a good balance fruiting spurs and lateral branches at 60° from the vertical and below and will not, in many instances form vigorous waterspouts.

Terminal bearing cultivars, such as Granny Smith, Rome Beauty and Fuji, will naturally bend below the horizontal under the weight of a fruit crop and remain productive. Both of the last two groups of cultivars can have limbs trained to the horizontal to encourage fruiting and control growth. However, pendant limbs and pendant spurs on the bottom of horizontal limbs produce small fruit of inferior quality. When limbs are pointed vertically downward, growth shifts away from the apex, growth is reduced and the limb becomes unproductive.

Not much is known about the proper time of limb positioning. To control vegetative growth, limbs should be bent during the period of rapid growth, not later in the summer. To control vigorous growth of shoots, they should be positioned early in the summer. If limbs are positioned to improve flower formation, positioning after flower initiation (late fall or during the dormant season) will not affect flowering in the immediate following season but may in following years. Preliminary experiments have shown that positioning limbs in March prior to bud break reduced fruit set of flowers which were on the limb. But, return bloom the following year is increased compared to vertical limbs.

The physiological effect of limb positioning is related to several possible hormone controlled mechanisms. First, at the time of bending, cell and tissue damage caused by the bending or positioning will result in the release of the gaseous hormone ethylene. The ethylene will cause an increase in limb diameter growth, and a reduction in terminal growth. Ethylene may also cause lateral bud development and bud breaking resulting in branches or spurs. Research has demonstrated that ethylene is released relatively rapidly after bending limbs of apple trees but it is dissipated relatively quickly.

Reorientation of the shoot terminal bud also affects shoot apical dominance. In the shoot terminal meristem, the hormone auxin is produced. Auxin moves downward in shoots in response to gravity and is partially responsible for inhibition of bud development and branching. When the shoot terminal is bent or repositioned to a more horizontal angle, there is a reduction in terminal extension and thus a quantitative reduction in auxin produced. Since auxins move in response to gravity, they will not be uniformly concentrated throughout the diameter of the limb but will travel along the underside of the limb. Consequently, nodes along the side or top of the limb will be released from apical dominance and begin growth while those along the bottom of the limb be inhibited, forming short weak spurs or not developing at all. Also, the auxins will increase cell division and cell wall growth along the underside of the limb forming thicker, supportive wood.

Pruning

Pruning apple trees is done to accomplish the tree training management objectives. Pruning limits tree size, improves light penetration, can encourage lateral branch development, balance shoot and spur development, limit crop load thereby improving fruit quality and size, and removes damaged or diseased wood. Pruning can be done almost any time of the year although response to pruning will vary with time which it is done.

Vegetative Response - Pruning is generally considered a dwarfing process; regardless of the time of year during which pruning is done or whether it is branch pruning or root pruning. Pruning causes a dwarfing affect by creating an imbalance of shoot and root growth. It is thought that trees grow with a "functional equilibrium"; or that shoots and roots grow in proportion to each other to their genetic limits as determined by rootstock and scion genetics and limited by environmental conditions (soil, moisture, temperature, and nutrition). By pruning, the equilibrium is disturbed. for example, pruning and removing shoots results in an imbalance of roots to shoots. In response, root growth will stop until the balance is reestablished. As a result of reduced root growth, there will be a reduction in water and nutrition uptake and ultimately shoot growth will be somewhat reduced. Eventually, the theoretical balance will be regained.

The size controlling effect of pruning has also been explained with a model which had endogenous hormones as the controller of growth. Removing shoots, whereby shoot meristems, terminal and lateral buds are removed, results in a

The size controlling effect of pruning has also been explained with a model which had endogenous hormones as the controller of growth. Removing shoots, whereby shoot meristems, terminal and lateral buds are removed, results in a reduction in auxin production. Auxins are transported basipetally to the root system and cause root branching and development. Roots are the source site of cytokinins which are transported acropetally to shoot tips in the transpiration stream of xylem. Therefore, pruning reduces auxin, which in turn would slow root development. Because of reduced root development, cytokinin production would be limited and shoot development would ultimately be reduced.

Although pruning is a dwarfing process, and many studies have shown that total dry matter production by fruit trees is reduced by pruning, pruning can have a localized stimulating effect. After pruning a tree, the individual shoots which grow in the following season may be longer than if the tree had not been pruned. However, total shoot length is reduced. This phenomena is due to two factors. First, pruning reduces the number of growing points on the tree and the remaining growing points are supported by the same root system with stored carbohydrate and nitrogen reserves to support a larger tree canopy. A second cause of the increase of individual shoot lengths is because of the reduction in crop size (fruit number). Pruning removes a number of flower buds. Fruits are a strong link for photosynthetically produced carbohydrates and their growth can account for 20-35% of the total tree dry matter accumulation in a growing season. Thus, reducing crop size by pruning will allow more carbohydrates to be partitioned into shoot growth. Similarly, the remaining fruit after pruning will be larger.

The regrowth after pruning is dependent upon the type of cut (heading cuts Vs thinning cuts), season of pruning, severity of pruning and crop load on the tree. Generally, heading back pruning cuts are more stimulating than thinning cuts. After heading, the most terminal shoot on the branch will create apical dominance over the subordinate limbs and grow longer than others. Thinning cuts, removing lateral branches or adjacent branches, is much less invigorating. Thinning cuts do not change the apical dominance scheme on a limb and all limbs tend to grow more uniformly.

Pruning severity affects regrowth. Heading cuts into the centre third of a current season shoot will result in the greatest length of the new apically dominant shoot. Heading cuts by only tipping a shoot will result in shorter regrowth as will heading into the base of the current season shoot. Heading into older wood will diminish the regrowth response both in the number of shoots forming from pruning and the length of individual shoots.

Typically, pruning during the dormant season, prior to budswell will result in the greatest regrowth response. Pruning after buds swell and flowers develop will reduce the regrowth response. Similarly, pruning during the summer will result in less regrowth than an equal amount of dormant pruning during a single year. However, after one or two years after the pruning, whole tree response may be similar. Pruning in late summer or early fall may not result in any regrowth because buds have entered physiologically controlled dormancy (rest).

Although pruning is used to control tree size, on trees which are heavily spurred or spur bound and carry heavy annual crops, pruning and reducing the crop load may cause an invigoration of the tree and development of younger wood. Our experience is that pruning is not as invigorating as crop removal and pruning cannot be done to correct runting problems.

Cropping Effects

Pruning reduces cropping by limiting both fruit number and total fruit weight. Pruning also causes the local vegetative invigoration. As a result of the vigorous vegetative growth and shoot growth duration is often prolonged after pruning, flower bud development does not occur. The more severe the pruning, the greater the reduction in bloom and yield. However, fruit quality is generally improved in response to pruning. The fruit which remain on the tree are larger, and may have improved fruit type. Because pruning can improve light relations in the tree, fruit color and soluble solids may be improved.

Pruning removes flower buds in the year of pruning and because pruning reduces total shoot length, it reduces the potential for future crops proportionately. Because of the localized invigoration after pruning, buds are more likely to stay vegetative instead of differentiating flowers. Pruning may result in a vegetative invigoration which is competitive with developing fruits for carbohydrates and result in increased June drop. Heavy pruning and the following vegetative invigoration may also cause problems of cork spot and bitter pit in the fruit. Dormant pruning on young, vigorous trees and spur-type cultivars will delay and reduce bearing. Heading cuts tend to reduce cropping more than thinning cuts. In training systems which require high, early production, pruning should be minimized. In mature trees, pruning is part of the fruit thinning system and should be practiced annually.

Because proper pruning will increase light penetration into a tree, there will be a redistribution of flowers, an improvement in fruit set and fruit quality. Pruning should be balanced around the tree, however, because heavy pruning in the top of the canopy may result in excessive regrowth which would shade the inside and bottom of the tree.

Summer pruning is often necessary to supplement the dormant pruning program and/or correct problems in the tree. Waterspouts should be removed early in the season when 10 to 20 cm long. Unwanted shoots of poor position, pendant

cause vegetative regrowth, reduced return bloom, shading problems, or reduced fruit size and soluble solids. A few, very judicious summer pruning cuts should be made.

Conclusion

Tree training is a thoughtful and deliberate process in orcharding. It is a total set of management elements including proper cultivar and rootstock selection, the appropriate orchard design and planting, supporting the trees, bending and positioning limbs, and pruning the trees. All aspects have to be considered together, not alone. Tree training should be done to accomplish orchard management objectives such as high production of quality fruit and high production efficiency. To maximize yield and quality, tree training and orchard systems should specifically consider optimizing light interception and maximizing light distribution within the tree. The response of the tree to support, limb positioning and pruning is related to several internal plant growth hormones. Understanding how the tree responds to training is helpful in achieving the management objectives and enjoying orcharding.

Ed Note: This article was originally published in the 1991 British Columbia Fruit Growers' Association Horticultural Forum Proceedings. It was the first part of a two part workshop-presentation by the author at that meeting. It is published here with the permission of the author and the B.C. Fruit Growers Association.

Curt R. Rom received his B.S. degree at the University of Arkansas, specializing in fruit culture and genetics; his M.S. at Ohio State University specializing in general horticulture (urban and commercial) with emphasis on physiology, writing his thesis on pruning and training of peach trees; and his Ph.D. at Ohio State University specializing in Pomology with emphasis on environmental physiology, his dissertation presented on the role of spur leaves in apple fruit development.

Dr. Rom is Associate Professor, Pomology, Department of Horticulture and Forestry, University of Arkansas, Fayetteville, where 85% of his time is spent in applied and fundamental research on production and growth of fruit trees and assisting in other fruit crop research programs; and 15% of his time is instruction/teaching classes in Introduction to Plant Sciences, Pomology - Tree Fruit Science, Current Concepts in Pomology, Modern Issues in Agriculture and he is the coordinator of the weekly, public horticulture seminar series for students, faculty, staff and the public.

Prior to joining the faculty at U of A, he was Assistant Professor/Assistant Horticulturist, Department of Horticulture and Landscape Architecture at Washington State University from 1984 to 1989 where 50% of his time was in research and 50% instruction in courses on Introduction to Horticulture, Tree Fruit Production, Horticulture Physiology, Plant Pest Management and Pesticide Application Technology, Senior Seminar and Profession Development.

Dr. Rom has also published more than 25 scientific research articles, three book chapters, more than 40 research abstracts, and more than 50 technical articles or summaries.



BOOKS AVAILABLE

The following books are duplicates found in the library of an HOS member which may still be available:

| | |
|---|---------|
| <i>Cox - View of the Cultivation of Fruit Trees</i> | \$36.00 |
| <i>Zielinsky - Modern Systemic Pomology</i> | \$20.00 |
| <i>Petzalg Birensalen (pears)</i> | \$36.00 |
| <i>Appelsortea (apples, written in German)</i> | \$36.00 |
| <i>Pest management for Apples and Pears</i> | \$30.00 |
| <i>Apple Maggots in the West</i> | \$ 5.50 |

Contact: Dewald Boswell 1249 NE 118th Portland, OR phone; (503) 255-1436

19th CENTURY REMEDY

"Baked sweet apples and milk is a luxury, excellent food, and medicine. We know a gentleman who, 10 years ago, was in a hopeless case of consumption, and by long and exclusive use of this dish, and a little bread for nutriment, and lime-water for a condiment, he was cured...This diet would cure thousands suffering from inflammatory diseases, caused by high, rich constipating food."

S. W. Cole, *The American Fruit Book*, 1849

"SHAGGY FUZZYFOOT" BEES
Fruit Grower - June 1995



A gentle, diligent pollinator with a tolerance for cool, rainy springs.

USDA scientist Suzanne Batra has recently introduced the shaggy fuzzyfoot bee, a pollinator of apples, blueberries, and other fruits, that just keeps on buzzing and working during early-spring rain or cold.

Honey bees usually stay in their nests when it's raining or when it drops below 50° F. But a shaggy fuzzyfoot will keep on pollinating at temperatures as low as 48° F. And a female shaggy fuzzyfoot is a genuine workaholic, visiting up to 337,000 flowers in her 60-day adult lifetime.

Batra, who raises the bees at her Beltsville laboratory, will ship them with instructions in late winter, while the bees are dormant. Shaggy fuzzyfoot (*Anthophora pilipes villosula*) bees are dormant almost the entire year—except for about two months from late March to late May. Batra brought the species from Japan to fill the early-spring niche here when honey bee and bumblebee populations are low.

The shaggy fuzzyfoot has another advantage. It can "buzz pollinate," meaning it shivers its muscles to create a vibration that releases the pollen from the tiny anthers in a blueberry flower. "Honey bees can't buzz pollinate because they don't vibrate their bodies to shake pollen loose. Buzz pollination is critical in blueberries and some other crops, because it releases the most pollen."

Batra received permission in 1989 to bring the bees into the U.S. from Japan. Batra now has about 1000 nests at the bee lab and wants to release some to interested apple, peach, pear, and blueberry growers and beekeepers for trials in the U.S. Batra says the bees are gentle, easy to keep in adobe blocks, and survived temperatures as low as 20° F last winter.

Interested beekeepers and growers should obtain import permits from their state's agriculture department. Batra will provide information on how to manage the bees. For details, contact Batra at the Bee Research Lab, ARS-USDA, Bldg. 476, BARC-East, Beltsville, MD 20705. Telephone 301/504-8384 / 8205 or fax 301/504-8736.

GREASE SPELLS RELIEF FOR BEES

What is the state of the honey bee industry? Widespread bee death due to mites has devastated bee populations. Tracheal mites have been in the U.S. since the early 1900's. They live inside tracheal tubes of bees and suffocate them by blocking their breathing tubes. However, Kim Flottum, editor of Medina, OH-based *Bee Culture* magazine, says the peak mortality of honey bees infected with (or due to) tracheal mites in the U.S. was reached a few years ago. He cites three reasons: 1) The most susceptible bees have already died; 2) Beekeepers who have lost bees are either out of business or are now treating; and 3) There's a possibility that bees are developing a natural resistance to these mites.

Researchers at Ohio State University's entomology department have found a possible treatment for tracheal mites. Hamburger-sized grease patties laced with antibiotics have been used to treat many bee diseases. It was noticed the grease patties killed mites as well. Research by OSU entomologists Diana Sammataro and Brian Smith determined that grease patties alone would control tracheal mites. They used oil-sugar patties made of one part Crisco to two parts granulated sugar.

Researchers believe the grease treatment interferes with one or more aspects of the mite's life cycle. Another explanation is that the grease makes the bee slippery so that the mite cannot latch on.

According to Jim Tew, Ohio State University Extension Entomologist, smell may be a factor. If the grease changes the bee's odor, mites may not be able to identify potential hosts.

INSECT BATTLE LOSES 35 YEAR VETERAN
by Jerry Rhodes Capital Press April 21, 1995

VANCOUVER, WA Carl Shanks doesn't have "entomologist" branded in inch-high letters on his forehead. But when he's in his office he might as well have. On the filing cabinet behind his desk a motto is posted: "I fear no weevil". On his computer monitor, a screen saver repeats, in numerous colors, "Root weevils are Bad!!!" On the wall, yellowed and curling clippings record the countless entomological musings of "Far Side" cartoonist Gary Larson.

But Shanks is trading it all. After 35 years as research entomologist, all of it as a small-fruit specialist at the WSU Research and Extension Unit in Vancouver. It's the first and only job he has had since receiving his Ph.D. from the University of Wisconsin-Madison.

"Entomology is a very fascinating field of study," Shanks says. "I have been interested in biology, insects in particular, since I was a kid. It's exciting to conduct an experiment and to get the results." Like the surrounding community, research has changed a lot in three decades. Where once Shanks and his associates spent most of their time on pesticide research on fields remote from the nearest neighbor, now they seek biological controls in a facility hemmed in by sub-divisions and commercial developments.

"In 1959, DDT was still being used," Shanks says. "By the early '60's, we saw (DDT and other organochlorine compounds) were going to be phased out. "I started looking for alternatives to control root weevils. Now I think 90 percent of my work is in non-chemical control of insects and mites.

Root weevils, as the memorabilia in his office attests, is at the heart of most of his work. For 25 years, that work has included a great deal of effort to find weevil-resistant, high quality strawberry plants. The strawberry plants on the hill Shanks can see from his office window are key to the work. They are a variety of wild beach strawberry (*Fragaria chiloensis*) that grows on the coast of Washington, Oregon, California and Chile. This strawberry has some resistance to the root weevil. Other wild strawberries are resistant to mites or soil borne diseases. In association with Pat Moore, a Seattle-area plant breeder, WSU has been crossing wild strains with domestic strawberries, then testing the results.

"We look at the fruit quality," Shanks says. "We hope to get one that is resistant to one or more pests and also has good fruit quality and quantity." If the plant doesn't meet the standards, it is used for more crosses, more tests. It is a tedious seemingly endless job. "We think the work is very important because we've lost a lot of pesticides we used to control pests on these fruits," Shanks says. Pests have become resistant to some pesticides. The Environmental Protection Agency has canceled some. Manufacturers have declined to go through the expensive process of continuing registration for others.

Sometimes, use of pesticides only increases crop losses, Shanks says. "Spider mites are a major pest on red raspberries," he says. "A few years ago, we got to looking at the population dynamics of spider mites and the factors that caused them to go up on some fields." The study showed that high numbers of spider mites occurred in fields where a high number of pesticides had been used. "We realized the pesticides were killing the predators and they were no longer killing the spider mites." The predator was a ladybird beetle (*Stethorus punctum picipes*). Just twice the size of the head of a pin, the adult and the larva of the species feed on spider mites and are very good about finding them. Sprays to control black vine weevil killed off the ladybird beetle, causing the spider mite population to increase. Research, then, focused on controls for the pest that won't kill the helpful predator.

"Three or four years ago, we ran across a red raspberry that was very resistant to spider mites," Shanks says. "We're pretty excited about that because the raspberry we've found that was resistant was already on its way to being a named variety."

Shanks' work on the strawberry root weevil, however, remains unfinished. "My dream was when I retired, we'd have a permanent solution to the root weevil problem, but we don't, Shanks says. Northwest strawberry growers still owe Carl Shanks a debt of gratitude. Recently breeder Moore named and released "Puget Reliance," a strawberry descended from one of the wild beach strawberries on the hill back of the WSU research unit in Vancouver. It's not resistant to insects, but it is resistant to red stele fungal disease (strawberry root rot). And it has become one of the highest yielding seedlings they've ever tested in Washington, Shanks says. A one-acre test plot of Puget Reliance yielded 20 tons of berries. The average yield for Washington state strawberries in 1994 was four tons per acre.

The Bee Line Editor's note: Lois Twelves, a North Olympic Fruit Club chapter member submitted this article, pointing out that this variety was given free to members at the Spring Plant Sale. She also suggests that water and fertilizer are the key to high production. Many thanks, Lois.

PUGET RELIANCE
NEW VARIETY BRINGS BIG BENEFITS FOR NORTHWEST STRAWBERRY GROWERS
Fruit Grower May, 1995

A new strawberry variety released in 1994 holds potential for reduced labor costs, greater virus resistance, and higher production for Pacific Northwest growers. Washington State University (WSU) plant breeders have incorporated a wild strawberry into the line in order to create the new berry variety, which they have dubbed Puget Reliance,

In research plots, Puget Reliance produced 33% more than the highest-yielding Pacific Northwest cultivars. It could yield as much as 2000 pounds per acre above average. At the 1993 price of 47¢ per pound, this could mean an increase of \$940 per acre.

The main advantage of Puget Reliance is its extreme virus tolerance. In field tests, the new variety remained vigorous and productive even though virus-infected, and it performed as well or better than virus free plants of current Pacific Northwest cultivars.

Patrick Moore, a horticulturist at WSU Puyallup Research and Extension Center, says that susceptibility to virus is a significant factor in the longevity of strawberry production. Moore estimates that the high level of resistance of Puget Reliance could add as much as one year to the life of a planting. According to 1991 figures for Willamette Valley growers, establishment costs can run from \$2000 to \$2500 per acre for strawberries.

About 23 acres of the new variety were planted commercially in the spring of 1994. They will be harvested this June. "It should give us a much better evaluation of its processing quality and where it will fit in the market," Moore says. "Puget Reliance has a good flavor and good quality. Our only concern is its processing quality." According to Moore, it is generally softer than Totem, and firmer than Benton. "Our general assessment is that it will be a growers' berry."

In 1993, Washington growers produced 2.2 million pounds of strawberries which were valued at nearly \$6 million.

Patrick Moore addressed the 1995 WCFS Annual Spring Meeting in Puyallup March 4 on the "Latest on Growing Strawberries and Raspberries in Western Washington."



WCFS AT THE PUYALLUP FAIR

Leonard Jessen, president of the Tahoma Chapter, built an outstanding display area for the Spring Fair at Puyallup. He was given an 8' x 20' area to work with. (The materials he purchased can be used in other displays also. Chapter Presidents, contact Dick Tilbury if you want to use any of WCFS's displays.) Leonard didn't have as much help manning the booth as he would have liked, but he sends a grateful "thank you" to those who did volunteer.

For the **BIG** Puyallup Fair, September 8 to 24, he is preparing a display, and hopes to have an area 10 x 30. He won't know until July 12 what **FREE** space we will be allocated, but will compromise on a 10 x 20 booth. Leonard is also negotiating on some **FREE** parking spaces for the **VOLUNTEERS** who will be manning it and he needs **YOUR** help. That means he needs two people per 4 hour shift, three shifts per day, for 17 days, which computes to 102 volunteers (unless some of us volunteer to work more than one shift). In exchange for working a four hour shift, you will be given a pass and will have the rest of the day to "Do the Puyallup". Please call him and offer to work a shift or two. His phone number is (206) 536-4590. Leonard also needs samples of fruit grown by our members. He has trees potted ready to take for display.

NEWS FROM PENINSULA FRUIT CLUB

The Peninsula Chapter is having an orchard tour at Max Meyers on August 10 for their meeting. It will start at 7:00 p.m., thirty minutes earlier than regular meetings.

Their annual Fall Fruit Show will be October 21 at the Westside Improvement Club in Bremerton.

CHERRY PICKIN'S

Did you know that in 1847 Henderson Lewelling crossed the Oregon Trail with 700 cherry, pear and apple tree seedlings planted in an ox cart laden with soil? That Henderson, his brother, Seth, and a few other rugged tree fruit industry pioneers claimed land and settled in Milwaukie, Oregon? That Seth developed sweet cherry varieties such as Bing, named for his 6-foot Manchurian farmworker, Black Republican and Lambert? That in the late 1800's, Seth sold even his best varieties of tree fruit seedlings for 15 cents each, less a 10% volume discount? That at the same time period fruit sold at the local market for a premium—apples sold for one dollar each?

Some cherry varieties from Canada are looking promising. **Lapins**, a firm cherry, slightly larger than a Bing, has a thick skin, yields well, has less cracking in a wet year than other varieties, is self fertile, matures about 10 days after Bing. On the down side, it is not an easy tree to grow; it is vigorous, requires spreading and early training, on windy sites may acquire brown spots following winds occurring ten days after shuck fall, which does not go away, and is more susceptible to mildew than Bing. **Sweetheart** is firm, self fertile, precocious ripens about two weeks after Bing; but susceptible to winter damage, which devitalizes the tree and it takes a year or two to recover. **Sylvia**, a split-resistant variety that looks like Bing, blooms late, ripens immediately after Bing, is of large size; however the tree is ugly and very upright in growth. **Newstar** is firm, sweet, attractive and can be large; it splits easily, but does have a long stem and is a low vigor tree. Watch for these in the future.

"You have to be a born gambler to be a cherry grower." states Rollie Harmon, general manager of Homeland Fruit Company at Bridgeport, Washington. (I wonder if this applies to the home orchardist?)

SOME STATISTICS ON SUMMER PRUNING TRIAL at a local growers orchard in British Columbia. The trial was from 1991 through 1994, seven treatments of pruning were used plus a control (no summer pruning).

- 1) modification of Spanish bush with no dormant pruning;
- 2) preharvest heading by removing 1/3 of current season's growth;
- 3) preharvest heading by removing 2/3 of current season's growth;
- 4) modification of Spanish bush with dormant pruning;
- 5) postharvest heading by removing 1/3 of current season's growth;
- 6) postharvest heading by removing 2/3 of current season's growth;
- 7) post harvest thinning cuts

The preharvest pruning was about two weeks before estimated harvesting date, and the postharvest was about ten days after harvest. Spanish bush treatments followed regime used by growers in Spain: beginning in the first year of planting, when current season's growth reaches two feet, remove half of the growth, repeated on any regrowth that may occur. Modification was that this was applied to trees that were established and five years old. All trees except the first Spanish bush treatment received regular, annual dormant pruning.

Yields did not differ in 1991 or 1992, but in 1993 increased by almost 50% compared to the control

Treatments 1 & 2 increased yield compared to the control

Treatments 5 & 6 reduced yields compared with treatments 2 & 3, as did treatment 6 compared to 5

In 1994 there was no difference when control was compared to the *average* of all treatments

For *cumulative* yields treatments 5 & 6 reduced yield compared to treatments 2 & 3

Size of tree, yield, and average fruit size of Sweetheart sweet cherry summer pruned 1991, 1992, 1993, and 1994

| Treatments | Canopy area | Cumulative yield | Average fruit weight |
|-----------------------------------|-------------------|------------------|----------------------|
| | autumn 1993 | 1991 to 1994 | |
| | (m ²) | (kg/tree) | (g) |
| Control | 8.4 | 51.2 | 8.0 |
| Spanish bush | 6.4 | 68.2 | 7.2 |
| Preharvest one-third | 8.4 | 76.7 | 7.6 |
| Preharvest two-thirds | 5.1 | 53.1 | 9.0 |
| Spanish bush with dormant pruning | 7.4 | 55.7 | 7.8 |
| Postharvest one-third | 7.0 | 63.6 | 7.9 |
| Postharvest two-thirds | 5.3 | 45.9 | 8.5 |
| Postharvest thinning | 5.9 | 47.1 | 8.7 |

The above information was gleaned from the May 15, 1995 issue of Good Fruit Grower, from articles written by Frank Kappel and Michel Bouthillier, Research Centre, Summerland B.C.; Sheryl Pace-Opfer of The Washington State Fruit Commission and Northwest Cherry Growers; David J. Burkhart, OSU Extension horticulturist now retired.

A QUARANTINE FOR CHERRY BARK TORTRIX?
Pacific Coast Nurseryman and Garden Supply Dealer
May 1995

At press time, Oregon was considering tougher defenses against the cherry bark tortrix, a pest that entered U.S. soil four years ago in Washington's Whatcom County. Since that time Cherry bark tortrixes have spread throughout the county, devastating many fruit trees and spread through Western Washington.

The proposed quarantine was originally to have gone into effect April 1. However, as that day approached the Oregon Department of Agriculture announced it was continuing to work with the industry in Oregon and the Northwest and with Ag Departments in other states to come up with a satisfactory solution to the problem.

As originally outlined, the proposed quarantine would cover the entire state of Washington, all of British Columbia and any other place where cherry bark tortrix is confirmed. It would ban the shipment from those areas into Oregon all species of prunus, crataegus, cydonia, malus, pyracantha, pyrus and sorbus unless accompanied by a certificate from state or federal agriculture officials verifying the plants are free of the pest, have been grown under conditions specified in the quarantine and fumigated.

In addition to affecting shippers of nursery products in Washington, the quarantine could affect nurseries, landscapers and others in Oregon who purchase plants from Washington or British Columbia, according to a statement of need and fiscal impact published by the Oregon Department of Agriculture.

Washington State officials say cherry bark tortrix is neither a serious pest nor does it warrant the quarantine proposed by the Oregon Department of Agriculture.

Oregon officials disagree. Quoted in an article in the agricultural newspaper *The Capital Press*, Kathleen Johnson, an ODA plant pest and disease program supervisor said: "The reason we are considering a cherry bark tortrix quarantine is because it is a damaging pest. We think research on cherry bark tortrix needs to be done here in the Pacific Northwest and we feel it needs to be surveyed so its spread can be monitored."

According to the newspaper article, ODA officials proposed the quarantine in part because the pest doesn't exist in Oregon and agriculture officials and the state's nursery industry want to keep it out, she said.

Oregon agriculture officials have laid traps along their five northwestern-most counties to detect the pest's advance as early as possible.

First discovered in North America in 1990 in British Columbia, the pest has since been documented in Western Washington apple trees, according to ODA documents.

But Steve McGonigal, executive director of the Washington State Nursery and Landscape Association, said the pest attacks only older trees or trees that have been injured and has not been found on young healthy trees.

"WSNLA is opposed to the shotgun approach in the ODA quarantine proposal," McGonigal told *The Capital Press*. "If the quarantine is imposed, it should be limited to trees with a diameter of 2 inches or more. He said the insect is not attracted to small trees because they do not have bark thick enough to provide shelter for the larvae.

McGonigal also believes Eastern Washington should be exempt because the cherry tortrix has never been found there.

The WSNLA executive also noted that U.S. Department of Agriculture officials do not consider the insect a serious enough pest to warrant a quarantine. He said it has been spreading naturally, not as a result of human activity. Thus, it will reach Oregon by natural dispersion whether or not there is a quarantine.

"I don't think it is much of a problem in British Columbia," McGonigal stated. "In Europe, it is not even considered a pest. It's just part of life."

Diane Dolstad, Washington State Department of Agriculture assistant director of agriculture for plant protection services, said Washington officials consider the cherry tortrix a pest of minor importance even on large trees. In the *Capital Press* article, she questioned ODA motives for proposing the quarantine, saying there is no justification for costly and time-consuming individual plant inspections for the tortrix on annual county surveys to detect its presence. "Quite frankly, we don't think we can stop its movement," she said. "We are concentrating on pests we can do something about."

The cherry bark tortrix, a moth, lives in its larval stage on the inside of bark, where it's shielded from pesticides. Larvae eat the inner bark from midsummer one year to early summer the next, when they turn into moths. The larvae of the cherry bark tortrix look like that of any tortrix, a common moth group in North America, and thus are not distinguishable. But the telltale sign of the new tortrix is a conical mound of sawdust or excrement at the mouth of its bore hole. Bores are often found in bark cracks, especially in trunk grafts.

In heavily infested trees, blossoms won't open, leaves drop and eventually the tree can die. There are no pesticides known yet to work well against the cherry bark tortrix.

Washington Chief Entomologist Eric LaGasa told *The Capital Press* 25,000 nursery stock trees were inspected in Whatcom County in the last three years and only two had the tortrixes. Both were bigger than normal nursery stock and damaged, he said.

"Those sizes of trees normally are not a part of interstate commerce because it simply costs too much to ship them," said Diane Dolstad. "The issue here is not whether or not the cherry bark tortrix is spreading. The issue is whether a quarantine will stop the spread."

Craig MacConnell, horticulturist for Whatcom County Cooperative Extension, said his agency is looking for money to run tests to see if some pesticides might work against the tortrix. He also wants to work with Oregon officials to know what research they want to be assured nursery trees pose no threat of carrying the tortrixes.

"Information for this article was collected from a number of sources including articles by Leo Mullen (3/24/95), Ed Merriman and Don Richardson (3/10/95) in the *Capital Press*; an article in the March, 1995, *Balls & burlaps*, and the written quarantine proposal from the Oregon Department of Agriculture Plant Division."

ON THINNING PEARS

Good Fruit Grower April 1, 1995

Pear growers would do better to thin off the smallest fruit, rather than thinning the fruit to singles as they do with apples, Dr. Max Williams believes. Williams, plant physiologist with the U.S. department of Agriculture, Wenatchee, who retired this summer, said he did research comparing the size of single and double fruit on Bartlett pear trees and found that fruit that hung in pairs were almost the same size as single fruit. Spacing fruit on pear trees can lead to over-thinning without a significant size benefit, he warns.

Williams has developed a method of predicting harvest size at thinning time for Bartlett pears and believes growers would benefit more from equipping their thinners with wire rings, or some similar device, so they judge which fruit to remove according to size, rather than space thinning.

A table he has prepared can help growers determine which fruit will be too small to meet grade standards at harvest. If the grower requires pears of at least 2 1/4 inches (5.72 centimeters) in diameter, and harvest is 125 days from bloom, the fruit should be at least 1 inch (2.69 cm) in diameter at 60 days from bloom. If harvest is only 110 days from bloom, the fruit should be 1 1/4 inches (3.2 cm) in diameter at 60 days from bloom to achieve the same size. All fruit smaller than those measurements should be removed at thinning time.

A small pear grows at the same rate as a large one, but, because it is small to begin with, it will be smaller at harvest, regardless of the amount of thinning done. Williams said at 60 days from bloom, final size can be predicted to within 1/12 inch (0.3 cm) in diameter 90% of the time. Hand thinning of Bartlett pears after 70 days from bloom has little beneficial effect on the size of the remaining fruit, he found.

The Bee Line Editor's note: As home orchardists, the same rule should apply, wouldn't you think? If one of our readers gives it a try, how about a report to publish in a future newsletter? Looking forward to hearing from you.

OOPS!

Seems as if I have more apologies to make. A GLARING mistake in the Spring issue, page 16. that is NOT a codling moth. It is an APPLE MAGGOT. Sorry Orel, it was misidentified to me. (That is a flicker, though!)

BITS AND PIECES

Letter to the Editor:

Re: Michael S. Mullen question on page 18 on the availability of obtaining scion wood from Brogdale. The enclosed forms should answer that question. However, the problem of getting them past U.S. Customs could be a problem. I have been interested in Brogdale scion wood, but did not know how to surmount this problem. Maybe either Gary Moulton or Sam Benowitz might be of some help in how either individuals or a group may get these scions.

(signed) Ron Richards

P.O. Box 361 Longview, WA 98632

Enclosed was a brochure from Brogdale Horticultural Trust, dated 1993, stating scion available (apples, pears and cherries) with no guarantee of freedom from pests, disease or virus; subject to Plant Variety Rights/Breeders approval and availability. The charge for 1 to 9 shoots of approximately 10 inches was £2.50 each, for 10 to 25 shoots £2.25 each, and 25+ shoots £2.00 each. All prices subject to postage and packing at cost.

Also enclosed was an order blank, graftwood orders by 15 February, budwood 15 August. Attention Mary Ellis, Brogdale Horticultural Trust, Brogdale Road, Faversham, Kent ME13 8XZ. Fax 0795-531710.

RASPBERRIES - RASPBERRIES - RASPBERRIES

Lots of raspberries? Have enough jam? Don't know what to do with them? Here's an easy recipe for a tasty, light dessert.

RASPBERRY FLUMMERY

| | |
|---------------------------|----------------------------|
| 1 quart fresh raspberries | 1/2 tsp. grated lemon rind |
| 1/3 cup sugar | 1 Tbs. lemon juice |
| 1/4 cup cornstarch | 2 tsp. sherry |
| 1/8 tsp. salt | |

Crush berries lightly. Measure and add water to make 3 cups. Combine sugar, cornstarch and salt and add to berries. Stir in lemon rind and lemon juice. Cook over medium heat, stirring constantly until thick. Stir in sherry, pour into dessert dish and chill. Spoon into individual serving dishes and top with whipped cream.

SOME BERRY FACTS

from Pome News, Summer 1995
contributed by Joline Shroyer of Canby, OR

FROZEN BERRIES

Berries that will be cooked later (such as in pies) can be washed, well drained, and frozen for 2 to 3 years in glass jars or other containers. For frozen berries you want to serve later like fresh berries (such as for shortcakes and in gelatins), I use this marvelous recipe that retains berry color and texture much better.

| Large Amount: | Small Amount |
|--------------------------------|---|
| 3 gallons sliced fresh berries | 1 quart (about 1 1/4 Pounds) sliced fresh berries |
| 3 cups sugar | 1/4 cup sugar |
| 1 2 oz. package pectin | 1 2/3 tsp. pectin |

Since berry pieces preserve best at about 1/3 inch thick, slice strawberries lengthwise into 2 slices (medium berries) or 3 slices (large berries). Do not slice small strawberries or raspberries. Large boysenberries and marionberries should be sliced. Mix sugar and pectin well and toss lightly with berries. Pack in jars or containers and freeze. When thawed (even two years later, I've found), they are equivalent to sliced fresh berries in color, flavor and firmness.

Then seek your job with thankfulness and work till further orders,
If it's only netting strawberries or killing slugs on borders;
And when your back stops aching and your hands begin to harden,
You will find yourself a partner in the Glory of the Garden
Rudyard Kipling
"The Glory of the Garden"

'Bloomin' Orchards Back 'In' In England

Apples are making a comeback in Britain. In the last century, Tovah Martin wrote in an article in the current issue of *Victoria*, some 6,000 varieties were grown in Britain and every parish had its favorite local varieties.

"Now the market is dominated by nine varieties - most of them imported," said Angela King, who with her friend, Sue Clifford, are founders of the conservation-minded Common Ground. King and Clifford have seeded a fresh appreciation of apples, and from the seaside villages of Cornwall to the rolling farmland of Wiltshire, old orchards that had not borne a crop for years are laden with fruit.

New orchards are being planted, and communities are gathering together to celebrate their shared heritage under blossoming boughs.

One inspiration for the apple comeback was an orchard in Lustleigh, Devon. For centuries it had produced bountifully, providing farm laborers with their quotient of cider. In the 1960s its owner bequeathed the orchard to the people of Lustleigh. They could share in its produce, but they must care for it, too - pruning and harvesting in season. Every May Day, the donor stipulated, the townfolk must hold a traditional celebration. "Lustleigh set a happy precedent, showing us that community orchards can work," Clifford said, and Common Ground has helped the idea take root elsewhere.

When King and Clifford formed Common Ground in the mid-1980s, it had nothing to do with apples. They wanted to conserve the distinctive local culture of England's parishes and villages. They set up a modest London office and their first project was to get villages to create parish maps celebrating what people cherished most in their neighborhoods. "We wanted to promote a sense of place," Clifford said, "to prod everyone to value his own local diversity."

Eventually, 1,000 towns joined in, producing artistic maps in all forms - watercolors, quilts, embroidery, photographic montage. That is when King and Clifford learned that every town once held an orchard at its heart. "At one time farm laborers were paid partly in cider, the common local beverage," Clifford said. "And so every parish, indeed every farm, had its orchard. But when the wage laws were reformed at the end of the last century, the orchards were slowly abandoned."

The pair discovered that Devon, Wiltshire and Kent, counties once rich in apples, had lost between 85 percent and 95 percent of their orchards since the World Wars. Under pressure from development and mass-food marketing, quantities of trees were slipping away. Apple varieties, some dating back to the 11th century, were also disappearing.

The above article was by the Associated Press and published in the *Peninsula Daily News* on Wednesday, May 10, 1995

YOUR FRUIT TREES AND WATER

Trees use water from the soil at a variable rate during the season. There are differences from year to year, but the general pattern remains consistent. Daily use is low during April, May, September, and October. The real irrigation season is June through August.

Your fruit will reach its potential in size and quality if moisture stress is kept to a minimum during the season. Trees are stressed by excess water application during the spring and fall, as well as by moisture deficiency during the summer. If the soil becomes too dry while the weather is causing high water demand, the trees dehydrate during an extended period during midday. When a tree falls behind in its water gathering, it borrows water from the fruit to keep the leaves functioning. If the tree overdoes this water borrowing three or four days in a row, the potential size and quality of the fruit is reduced, no matter how well the tree is watered the rest of the season.

Careful irrigation can maintain or even improve fruit quality. The easiest irrigation "scheduling" choice is watering on a predetermined day interval, never risking dry soil. Irrigation is your key summertime cultural activity. When other important activities are pulling your attention away, you may be tempted to neglect the watering. Proper soil moisture management may not be as exciting as a good spray job or fertilizer application, but it pays off better and may cost a lot less.

The Bee Line Ed's. note: The above remarks are from an article entitled "Orchard Irrigation Scheduling" by Tim Smith in his column "Practical Grower" in the *Good Fruit Grower* July, 1995 issue. The article was directed mainly to eastern Washington growers, but his comments are applicable to all fruit growers. I tried to pick out the information that would be useful to home orchardists in western Washington.

A WAKE-UP CALL TO THE CIDER INDUSTRY

from Ellen Terpstra's column **RIGHT TO THE CORE**

Published in Fruit Grower-December, 1994

In August, the U.S. Food and Drug Administration (FDA) announced it was considering requiring that the entire food industry, including fresh produce, adopt a food safety-assurance system that earlier this year was required of the seafood industry. Until early December, FDA accepted comments on its proposal to mandate use of the Hazard Analysis Critical Control Points (HACCP) system.

Critical Control Points—HACCP is a preventive approach to food safety that entails identifying critical points in the production of a product at which food safety could be compromised, and then establishing monitoring systems and defining corrective actions in the event control is lost at any of those points.

FDA's proposal has certainly gotten the attention of the produce industry, with discussion ranging from "HA--what?" to the inevitable, and critical, question "why us?" And after reading the title of this column, you're probably asking "so what has this got to do with apple cider?"

Cider-Linked Illness—Cider is a prime example of how our industry can and should be affected by HACCP and the concern from which it is born. Recent illnesses have included *E. coli* illnesses in 1991 in Massachusetts linked to improperly-processed commercial cider, and this past October in Washington state preliminarily traced to improperly-made homemade cider. These incidents have cast a shadow over a product previously considered a sacred part of the American fall experience.

Some industry members argue that the cider industry could go a long way toward restoring consumer confidence by voluntarily embracing HACCP and the accompanying best manufacturing practices. Massachusetts is already headed in that direction, in response to the attention it received following the 1991 illnesses. Taking such a positive step could help the product's now slightly tarnished image.

Don't Wait for FDA to Act—The apple industry shouldn't wait for FDA to step into this scenario with mandatory regulations. With board approval, International Apple Institute (IAI) is launching a research project with two goals: to identify what microbiological nasties reasonably may be considered a threat to cider, and then to identify methods for destroying the threat(s). An industry task force will guide IAI staff on this project. Difficult policy questions will be raised, such as whether to recommend an HACCP-type process that could impose significant costs on small manufacturers.

Until more answers are available, IAI urges all cider manufacturers to follow good manufacturing practices, including washing and brushing apples, refrigerating pressed product, and observing industrial hygiene practices. If your state licenses and inspects, get licensed and inspected. If your state doesn't, get a copy of requirements from a state that does. Diligence is required if the industry wants to govern its own future.--*Julia Stewart Daly, IAI director of communication, contributed to this story.*

HONEYCRISP APPLE: EXPLOSIVELY CRISPI

This new mid-season cultivar features exceptionally crisp, juicy texture and grows well in colder climates

Honeycrisp is the newest apple variety to come out of the University of Minnesota's Horticultural Research Center. Its fruit is exceptionally crisp and juicy texture. Its flesh is cream-colored and coarse. The flavor is sub-acid and ranges from mild and well-balanced to strongly aromatic, depending on the degree of maturity.

Honeycrisp fruit has shown excellent storage characteristics. The tree is moderately vigorous with a somewhat spreading growth habit. It appears to be well-suited to a central leader training system, although the leader may require staking or some fruit removal due to early bearing. The tree is a reliable annual bearer and has shown good precocity on dwarf rootstock. Additionally, the tree has exhibited good winter hardiness under winter conditions in central Minnesota.

Honeycrisp is a mid-season cultivar. This variety is a good choice for pick-your-own as well as wholesale operations. Honeycrisp does not carry any known exceptional resistances to diseases or insects.

A list of nurseries licensed to distribute Honeycrisp is available from the Dept. of Horticultural Science, Fruit Breeding Program, University of Minnesota, St. Paul, MN 55108.

POTTED KIWIS
by David Kuchta
FRUIT GARDENER May/June 1995

Ed. note: This article represents David Kuchta's suggestions for growing potted kiwis in northern climates where low winter temperatures present a problem for growing many of the *Actinidia* species.

Many people ask me if they can grow kiwis in a container. The answer is yes, but I recommend only certain cultivars. I have tried to grow *deliciosa* or regular market kiwi several times here in Pennsylvania but have had bad results every time. The biggest problem is that *deliciosa* is a very rampant grower. Its wood is brittle and if you try to bend a branch when putting them in storage for the winter, it will break like a celery stock. This is unlike *arguta* which is very flexible.

The second problem with *delisiosa* here in the north is that they would have to be stored somewhere during the winter months. Otherwise they will die back to the ground when the temperatures reach below about 10° F.

One winter I placed about a dozen pots of large *delisiosa* in an unheated shed. The plants were completely dormant. Some I covered with old blankets and burlap. They all died back to the ground and in moving them to storage I broke several branches. The plants would have to be just too large to produce blossoms to fruit. Unless you have a large area and a good place to store them during the winter months, I don't recommend them for potting in the colder climates.

I have found that the Japanese cultivar known as 'Issai' works very well as a potted plant. In the past, I have, for various reasons, condemned this plant for growing in an orchard or for marketing. But it has its virtues. One good benefit from 'Issai' is that it can bloom and produce fruit the second year. Another is that since it is self-fertile you won't have to have a male pollinator.

Start them in a four-inch pot and then in the second year put them in a gallon-size container. I have kept some 'Issai' in gallon containers for two and three years. This will dwarf them because of the constriction of the root system. They will need some plant nutrients but unlike in the orchard where many people use a lot of nitrogen for large vines, their nitrogen uptake must be kept on the low side. This will keep the plant from getting out of hand and the small pot will aid in root constriction. In the fourth and succeeding years, transfer the plant to the next larger size pot. This way you will have a patio plant as well as some fruit.

'Issai' is hardy to zone 5. In zones 3 and 4, the plant will have to be put away in a dark, damp area. this area can drop below freezing without harming the plant.

I have also found out that the Russian species *kolomikta* will make a good patio plant. They are slow growers and can be grown more like a bush than a vine. The *kolomikta* will blossom and fruit about the third year. Unlike 'Issai', *kolomikta* needs both male and female plants for pollination. *Kolomikta*, both male and female, has colored leaves in the spring season. Some books claim only the males have these nice red, yellow and white coloring on variegated leaves. I have found this coloring in both male and female plants.

The nicest part of *kolomikta* is the scent of the blossoms. They give off a beautiful Lily-of-the-Valley-type scent. Of all the varieties of kiwis, I have found that *kolomikta* has the nicest scent of all. The fruit of *kolomikta* is one of the smallest of the edible kiwis. They are the size of a cherry or grape. Since they are a slow grower and don't produce an abundant harvest, I don't recommend them for market sales. What I do like about them is that they blossom before the other hardy kiwis and are the first to ripen. This can give me an indication that the other hardy kiwis are just about ready to be picked for the markets. In my area, *kolomikta* is about two weeks earlier than the *arguta* types.

Kolomikta is a very hardy plant. I have yet to see one die back or have any trunk splitting. They can also be grown in partial shade with very little trellising. Having an 'Issai' and a *kolomikta* plant on the patio can make your selection of plants unusual and rewarding. When you have visitors at harvest time, look at the expression on their faces when you pull off one of the kiwis and start enjoying "the fruits of your harvest."

David Kuchta, owner of Kiwis 'R' Us, experiments with raising bumblebees when he's not busy with his kiwis. He lives in Nesquehoning, PA.

BEE LIZE Ed. note: This may be of interest to those of you interested in container gardening. I wonder if Bob Glanzman has had experience with 'Issai' as a potted plant, or *kolomikta* for Western Washington. Let us know, Bob.

JAMS and PRESERVES
A MICROWAVE METHOD for the CURIOUS
by Jim Cox, Portland
Pome News Spring 1994

This writer has experimented with jams and preserves for over 10 years and found the microwave method to be fun and rewarding. It is based upon using a full size machine of the 700-750 watt range set on full power. You will need a 4 quart corning ware container about 4 inches deep (essential). You should have an oven-size glass base dish.

A few observations: Don't boil the mixture for the total time, all at once. Keep your fingers away from the jam. Burns can be painful! Be sure to put the light on in the oven. You will need to observe the jam cooking--it will "rise" which is normal in all stages. Towards the end stages it wants to boil over (and of course you do not want it to)--this is a very important fact. Some jams do not need any scum removal. The rising will deposit most scum on the high sides of the container. Bacteria are killed by the microwaves and by the heat.

It is not necessary to stand by the oven as would be the case with conventional jam making, only after 30 minutes to observe the final stages. This writer has not experimented on jam butters, however should you decide to try the regular jams and preserves I am sure you can adapt these methods for butters.

An easy recipe for Kiwi Jam

I use HAYWOOD variety of Kiwi (available at supermarkets) 2 pounds 2 ounces fresh ripe kiwi
2 pounds sugar 1 Tbs. lemon juice ½ cup Liquid pectin (if you wish)

Cut kiwis in half crossways, scoop out the meat with a spoon. Discard skins. Put sugar and fruit into the deep coming ware container. Mash the fruit and sugar together using a potato masher.

1st stage: Cook for 10 minutes, then stir (just to make sure there are no pockets of sugar).

2nd stage: Another 10 minutes of microwave cooking. Add lemon juice and pectin, stir quickly

3rd stage: Resume cooking for approximately 8 minutes. Another quick stir then---

4th stage: 3 or 4 minutes cooking time, paying attention to the rising of the jam because it can easily go over the top. If the jam boils over, remove the coming ware dish, put in on a hot, wet dishcloth then carefully remove the glass dish containing the overflow and pour the jam back into the coming ware container. (Of course you remembered to put in the glass overflow dish so you didn't waste any of this tasty concoction.) Resume cooking for one or two minutes to be sure the mixture has reached the jam syrup stage.

5th stage: Remove from oven. (Have small jars ready. They should be clean and sterile with seal top lids.) Put jam in jars, wipe the top edges, put on lids, screw tight and they will seal in a few minutes. The jams cooked using this method need no refrigeration after opening.

A note of interest: With very few exceptions, bacteria will not grow in the presence of sugar. Jam is preserved because of this.

Helpful Tips:

1. From the beginning of cooking the microwave jam appears to boil. Not so--it is rising. The boiling stage at the end is different. It looks more like candy sugar syrup and will boil right over the edge if given the chance. For this reason using a 4 quart, 4 inch deep dish is essential.
2. Once a jam has been made it can be melted down without burning, in a minute or two.
3. For stirring jams when first starting out, a long wooden spoon works fine. It can be left in the jam right through the cooking stages without harm. In fact it's best to leave it there so you will not drip jam all over the place.
4. Don't put any jars with lids on in the microwave.
5. Corrections can be made:

Jam too thick? Boil up a little water, open up the jam, remove a tablespoon of jam and replace it with a tablespoon of boiling water. Cut the water into the jam with a long knife. Place the jar in a soup bowl and remicrowave. It will boil quickly. Pour any overflow back in the jar, then reseal if needed.

Peach jam too sweet? Crush some blackberries for the juice. Boil up but do not add any sugar. Strain through a cloth. Remove 2 Tbs. jam from the jar and replace with 2 Tbs. blackberry juice. Cut in with a knife, remicrowave and reseal. jams can also be blended by crossing between flavors and heating and resealing as above. The time is about 4 minutes total.

Jars did not seal? Remove lid, inspect glass edge for irregularity or chip. Use either new jar or new lid. Remicrowave and seal.

SOIL TESTING

It's a good idea to test your soil every two or three years. Soil tests commonly offered include:

- pH - determines the acidity of your soil and estimates how much lime should be applied to adjust the pH to a more optimal level.
- Nutrients - determines the levels of available plant nutrients. Often labs don't bother to test for nitrogen, since this test is often misleading. Around our area you can assume your soil needs moderate inputs of nitrogen every year. Some labs test for calcium. This is unnecessary too, since you will be adding lime (calcium carbonate) for pH balance anyhow.
- Organic matter - determines the percentages of sand, silt and clay in the soil and classifies it by texture according to the USDA system (ex. silty loam). Since your soil texture is not going to change, you only have to request this test the first time.
- Heavy metals - determines whether your soil contains abnormally high levels of toxic heavy metals. Sometimes the test is strictly for lead, the most common garden heavy metal contaminant. Usually if levels are elevated, recommendations will be included on steps to take to counteract the danger.

Whatever test you do, the procedure for taking the sample is the same. Each area where the soil looks different or has been treated differently should be tested separately. There will be variations even within a rather homogeneous area, so you will need for the sample you send to be a composite of several samples. Using a clean trowel or spade, take thin vertical slices of soil from about 10 locations within the area they are to represent. Put them in a clean bucket and mix thoroughly. From this, take the cup or quart or whatever amount your lab requests.

For most purposes you will want to sample the top 6-8 inches. For fruit you should go down to 8-10 inches.

Don't sample in abnormal spots like right next to a fence, driveway, sidewalk or building. Make sure your shovel and bucket are not contaminated from the last time you fertilized. Don't sample a soil that has just been fertilized or limed. Any of these things could throw the results way off.

Now that you have your sample, let's figure out where you are going to send it. WSU closed its soil testing facility many years ago. Their lab was hopelessly out of date and would have been too costly to modernize. Oregon State has been doing the soil testing recently for western Washington gardeners. As of this spring, they have discontinued this service and now the only university lab available to us in the region is Idaho.

The Idaho soil test is \$37.00 and is not as complete as you might like. (They don't test for lead, for instance.) We suggest, therefore, that you check with local labs, which should be competitive. Make sure that their basic soil test package includes the tests you want and that they interpret the numbers for you into fertilizer recommendations.

Now for the good news. The University of Massachusetts offers the tests most gardeners need at a very reasonable price. The standard test does pH, nutrients and heavy metals for just \$7.00. An organic matter test can be added for just \$3.00 more. The word is out, so Cooperative Extension now stocks their soil test order form in our bulletin office. Call 296-3900 to have one mailed to you. [I personally think the only way they can do it at this price is if they have an ulterior motive. I believe they are trying to build a ski slope on their Amhurst campus and this is a way to get us to send them soil to build the mountain.]

Ed's. note: The above article by Holly S. Kennell, WSU Extension Agent for King County was submitted by Dick Tilbury. Holly also recommends thinning fruit in June and July to 4-6 inches apart.

LITTLE KNOWN FRUIT*: THE WORCESTERBERRY

The worcesterberry is often described as a hybrid between the gooseberry and black current, but it is now more generally considered to be a form of the North American species *Ribes divaricatum*. The fruits, borne singly, are a dull black, and much smaller than the gooseberry, being about ½ in across. they have an acid flavour, but make good jam. The bush resembles the gooseberry in leaf and form, but it is more vigorous and very thorny. In comparison with the gooseberry, it is not very productive. However, it is fairly hardy and disease-free. For cultural purposes, treat it in exactly the same way as the gooseberry.

A description from "Fruit" by Harry Baker

* Little known to the editor!

NAFEX CONFERENCE NEWS

If you are undecided about attending the NAFEX Conference August 21 to 24, perhaps this information about SOME of the speakers and/or subjects on the tentative program will convince you not to miss it:

| | |
|--|--|
| Cherry Training Systems | Helmut Arndt, B.C., Ministry of Agriculture, Fisheries and Food, Kelowna |
| Soft Fruit Training Systems | (speaker not named) " " " " , Oliver |
| Persimmon Growing | Jerry Lehman |
| My Crystal Ball on Apple Cultivars | Dr. Robert Norton, Horticulture Consultant, Wenatchee |
| Fertigation of Orchards | Ted Van der Gulik, B.C. Ministry of Agriculture |
| Training Systems for Apples | Mike Sanders, B.C. Ministry of Agriculture, Kelowna |
| Great Table Grapes | Dr. Andy Reynolds, Agriculture Canada, Summerland |
| Hardy Kiwi Production | Bob Glanzman, Puget Sound Kiwi Co., Seattle |
| Organic Fruit Production | Wayne Still, Orchardist,, Keremeous |
| The Okanogan Tree Fruit Industry | Dr. Norm Looney, Agriculture Canada |
| New Developments in Plant Propagation | Dr. David Lane, Agriculture Canada |
| The Problems of Evaluating New Varieties | Jim Ballard, Educational Director, Pacific Northwest Fruit Testers Assn. |
| Present and Future Okanogan Stone Fruit Varieties | Dr. Frank Kappel, Agriculture Canada |
| Growing Sub-Tropical Fruit in a Northern Climate | Bob Duncan, Entomologist Canada, Forest Service, Victoria |
| New Canadian Raspberries and Strawberries | Kim Maser, Consultant, Kelowna |
| Evaluating and Identifying Cultivar Potential | Wendy Couriard, Pico, Summerland |
| Update on New Apple Cultivars from the Summerland Program | Dr. Harvey Quamme, Agriculture Canada |
| The Use of Two Native Plants (Saskatoon, Chokecherry) as Alternate Crops | John Price, B.C. Ministry of Agriculture, Vernon |
| History of Fruit growing in the Okanogan | Wayne Wilson, Orchard Museum, Kelowna |

Hmmm looks as if I have named them all. Didn't want to take the chance that an omission might be the one subject that would swing your decision to go!

Speaker at the banquet the evening of August 22: Dr. Robert Norton, "Some of My Exciting Journeys in the Fruit World"

The bus tours on August 23 and 24 will include:

- Agriculture Research Station, Summerland
- various intense commercial orchards; 1000 - 2000 trees per acre
- winery and grape fields
- packing plant
- peach orchard
- pear orchard
- fruit stand operations

As you can see, there is something for everyone. Registration forms, page 29 of the Spring 1995 issue of *The Bee Line*. Make the deadline of July 15 for the reduced registration rates. Don't be one who says, "I wish I had gone" when you hear the reports of those who did go!

LAST MINUTE INFORMATION: Not many from the west have registered for this conference. It is **VITAL** that there be a good show of Washingtonians, Oregonians, Californians, Idahoans if there is to be a conference scheduled for this area again.

You have more'n likely noticed,

When you *didn't* when you *could*,

That jes' the thing you *didn't* do

Was jes' the thing you *should*.

"Perversity" by James Whitmore Riley

1995 WCFS EXECUTIVE COMMITTEE AND BOARD MEMBERS

EXECUTIVE COMMITTEE

| | | | | |
|--------------------------|----------|-------------------|----------|-------|
| JOE ZEPPA, President | 524-8943 | 7014 58th Ave NE | Seattle | 98111 |
| CHUCK HOLLAND, Secretary | 523-8350 | 6831 35th Ave NE | Seattle | 98115 |
| EVELYN HOYME, Treasurer | 485-3835 | 18709 24th Ave SE | Bothell | 98012 |
| T. K. PANNI | 747-4541 | 4541 130th Ave SE | Bellevue | 98006 |
| RON SCHAEVITZ | 362-1227 | 1227 NW 117th St | Seattle | 98177 |
| DICK TILBURY | 723-9009 | 4916 52nd Ave S | Seattle | 98118 |

BOARD OF DIRECTORS

1996

| | | | | |
|---------------|----------|-------------------|---------|-------|
| LARRY BARELLO | 683-8297 | 50 Willard Dr | Sequim | 98382 |
| BILL DAVIS | 771-8978 | 21102 Summit Lane | Edmonds | 98026 |
| DICK TILBURY | 723-9009 | 4916 52nd Ave S | Seattle | 98118 |

1997

| | | | | |
|--------------|----------|-----------------------|---------|-------|
| ERNIE MAZZIE | 943-2504 | 4427 Boston Harbor Rd | Olympia | 98506 |
| GIL SCHIEBER | 783-8262 | 7016 Jones Ave NW | Seattle | 98117 |
| OREL VALLEN | 772-2119 | P.O. Box 78358 | Seattle | 98178 |

1998

| | | | | |
|---------------|----------|-------------------|----------|-------|
| CHUCK HOLLAND | 523-8350 | 6831 35th Ave NE | Seattle | 98115 |
| STEVE JACKSON | 868-8344 | 2330 229th Ave NE | Redmond | 98053 |
| T.K. PANNI | 747-4541 | 4541 130th Ave SE | Bellevue | 98006 |

CHAPTER PRESIDENTS

| | | | | |
|--------------------------------|----------|------------------------|--------------|-------|
| BILL ROSENBERGER, N Olympic | 683-8861 | P.O. Box 1865 | Sequim | 98382 |
| PAM BUCK, Peninsula | 674-2604 | 6835 Old Clifton Rd SW | Port Orchard | 98368 |
| RON SCHAEVITZ, Piper Orchard | 362-1227 | 1227 NW 117th St | Seattle | 98177 |
| MARLENE FALKENBURY, Seattle | 522-2273 | 7547 32nd Ave NE | Seattle | 98115 |
| DAVID DANDURAND, S Puget Sound | 288-2722 | P.O. Box 23 | Amanda Park | 98526 |
| SUSAN BARRETT, S Puget Sound* | 264-2508 | 17701 Mima Acres Dr SE | Tenino | 98589 |
| LEONARD JESSEN, Tahoma* | 536-4590 | 6703 48th Ave E | Tacoma | 98443 |

*Co-Presidents

IMMEDIATE PAST PRESIDENT

| | | | | |
|-----------------|----------|--------------|-----------|-------|
| Charles Parkman | 452-6600 | P.O. Box 128 | Carlsborg | 98324 |
|-----------------|----------|--------------|-----------|-------|

NEWSLETTER EDITOR

| | | | | |
|--------------|----------|-------------------|---------|-------|
| Evelyn Hoyme | 485-3835 | 18709 24th Ave SE | Bothell | 98012 |
|--------------|----------|-------------------|---------|-------|

The Bee Line is the newsletter of the Western Cascade Fruit Society.

It is published quarterly; January, April, July and October and is included with membership.

The material herein is the property of the authors and except for other nonprofit organizations with whom we have agreements, may not be copied without permission

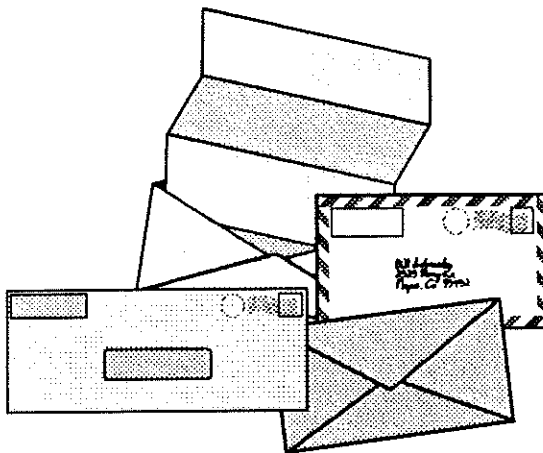
On page 27, you'll see what all those colors mean on the due date section of the label. If you don't have a color, nothing to worry about. If it is green, complete the renewal form and send it in a couple of weeks or so. If its yellow, in a few days. If its RED, do it NOW. (That red is more like a bright pink, but its the closest we could get.)

NEXT NEWSLETTER EARLY OCTOBER

COLOR CODING FOR YOUR DUES REMINDER

If the DUE DATE on your mailing label is highlighted in **green**, your dues are payable before the next newsletter.
If it is highlighted in **yellow**, your membership dues are delinquent.
If it is highlighted in **RED**, this is your last newsletter. **DON'T LET IT HAPPEN TO YOU, WE'LL MISS YOU.**

INCREASED POSTAL RATES HAVE EFFECTED BULK MAILING ALSO. (AND WE PAID AN INCREASE JUST LAST OCTOBER.) IT IS VERY IMPORTANT THAT YOU LET US KNOW OF YOUR CHANGE OF ADDRESS AS THE POST OFFICE CHARGES 50 cents FOR EACH ADDRESS CORRECTION AND TRASHES THE NEWSLETTER. IT IS 78 cents TO SEND ANOTHER ONE TO YOUR NEW ADDRESS AND WE DON'T ALWAYS HAVE EXTRA COPIES. **SNOWBIRDS** YOUR NEWSLETTER IS TRASHED ALSO. LET US KNOW IF YOU ARE GOING TO BE AWAY "TEMPORARILY" SO WE CAN HOLD IT, OR GIVE US YOUR TEMPORARY ADDRESS AND WE'LL SEND IT THERE, IF YOU WISH.



WESTERN CASCADE FRUIT SOCIETY MEMBERSHIP INFORMATION

Please indicate standard WCFS membership or affiliation with a chapter. Dues are as noted.

Name(s) _____

() New

() Renewal

Street Address _____

City, State, Zip _____

Phone _____

PLEASE SPECIFY ONE CATEGORY BELOW

Standard \$10.00 () North Olympic \$10.00 () Peninsula-Kitsap \$10.00 ()

Piper Orchard \$10.00 () Seattle Tree Fruit \$18.00 () Tahoma \$10.00 () South Puget Sound \$10.00 ()

() ENCLOSED FIND \$5.00 EXTRA FOR WESTERN WASHINGTON FRUIT RESEARCH

HOW CAN YOU HELP THIS YEAR? PLEASE CIRCLE AS MANY AS POSSIBLE

BOARD MEMBER FALL FRUIT SHOW PUBLICITY FIELD TRIPS SPRING MEETING SPEAKER
COMMITTEE CHAIR ARRANGING FOR SPEAKERS OTHER _____

TELL US YOUR FRUIT INTEREST. SO WE CAN PUBLISH ARTICLES OF INTEREST FOR ALL

Apples Pears Peaches Plums Cherries Kiwis Nuts Berries Other: _____

Make checks payable to WESTERN CASCADE FRUIT SOCIETY and mail to:
WCFS Treasurer, 18709 24th Ave S.E., Bothell, WA 98012

YOU'LL FIND IT HERE!

| | |
|---------|---|
| Page 1 | COMING EVENTS |
| Page 2 | NEWS FROM THE BOARD ROOM |
| Page 3 | FALL FRUIT SHOW 1995 CHAPTER LIAISON-ERNIE MAZZIE |
| Page 4 | 1995 MOUNT VERNON HARVEST SCHEDULE |
| Page 5 | COX'S ORANGE PIPPIN - AT HOME IN BOW |
| Page 6 | UNDERSTANDING FRUIT TREE TRAINING |
| Page 12 | AVAILABLE USED BOOKS |
| Page 13 | "SHAGGY FUZZYFOOT" BEES GREASE SPELLS RELIEF FOR BEES |
| Page 14 | INSECT BATTLE LOSES 35 YEAR VETERAN TO RETIREMENT |
| Page 15 | 'PUGET RELIANCE' A NEW BREED OF STRAWBERRY WCFS AT THE PUYALLUP FAIR NEWS FROM PENINSULA FRUIT CLUB |
| Page 16 | CHERRY PICKIN'S |
| Page 17 | A QUARANTINE FOR CHERRY BARK TORTRIX? |
| Page 18 | ON THINNING PEARS |
| Page 19 | BITS & PIECES: RASPBERRIES, STRAWBERRIES |
| Page 20 | 'BLOOMIN' ORCHARDS ARE BACK 'IN' IN ENGLAND YOUR FRUIT TREES and WATER |
| Page 21 | A WAKE-UP CALL TO THE CIDER INDUSTRY HONEYCRISP APPLE: EXPLOSIVELY CRISP! |
| Page 22 | POTTED KIWIS |
| Page 23 | JAMS and PRESERVES |
| Page 24 | SOIL TESTING |
| Page 25 | LAST CHANCE FOR THE NAFEX CONFERENCE |
| Page 26 | WCFS EXECUTIVE COMMITTEE AND BOARD OF DIRECTORS |
| Page 27 | MEMBERSHIP RENEWAL FORM |

WESTERN CASCADE FRUIT SOCIETY EDITOR
18709 24th Avenue S.E.
Bothell, WA 98012

FORWARDING AND RETURN
POSTAGE GUARANTEED
ADDRESS CORRECTION REQUESTED

NON-PROFIT
ORGANIZATION
U.S. POSTAGE PAID
BELLEVUE, WA
PERMIT #366

DICK & MARILYN TILBURY
4916 52ND AVE S
SEATTLE, WA 98118

7-7-95

DEC95