The Bee Line

NEWSLETTER OF

WESTERN CASCADE FRUIT SOCIETY

A NON-PROFIT EDUCATIONAL ORGANIZATION

Volume 19 Number 3 Summer 1998

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

YOU'LL FIND INSIDE

DATES TO REMEMBER

August 8	WCFS Board Meeting 10:00 a.m. Federal Way Regional Library
September 2	**WCFS** at Evergreen State Fair in Monroe manned by Seattle Tree Fruit Society members
September 11	Puyallup Fair Opens **WCFS will be there through Sept 27**
September 12	WWTFRF Harvest Day at Mount Vernon
October 3	Peninsula Fruit Club Fruit Show
October 10	WWTFRF Field Day at Mount Vernon
October 17/18	**WCFS Fall Fruit Show**
October 19	North Olympic Fruit Club Fruit Festival

1998 FALL FRUIT SHOW INFORMATION

DISPLAYING YOUR FRUIT

Orel Vallen says it is not too early to start thinking about what you are going to display on October 17 and 18.

Have **YOU** considered submitting your fruit for display?

This event is **FOR** you and **BY** you. Even if you have only a small selection, it is needed. Visitors need to know how many home orchardists there are, and that we are all active.

The following procedures were designed to make the displays look compatible:

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 the 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 table.

DO YOU HAVE A MYSTERY APPLE?

The apple identification experts will be there to name yours. You should select fruit that is typical in color, size and shape for the tree you are trying to identify. To assist them, bring four to six specimen with stems and free of blemishes. If you don't 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 the following questions:

- 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?
- When is the fruit ripe?
- How long does it 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?

DIRECTIONS TO TUKWILA COMMUNITY CENTER

I-5 Northbound: exit 156 (Tukwila, W Marginal Way)
Stay in right lane & take Tukwila exit.
Turn left onto Interurban Ave continue north for .4 miles turn right onto green bridge at light. Take first right into Cmmunity Center lot.

I-5 Southbound: exit 156 (Tukwila, Interurban Ave) turn right onto Interurban Ave continue north for .6 mile, turn right onto green bridge at light, take first right into Community Center lot.

VOLUNTEER VOLUNTEER VOLUNTEER

Volunteers are needed to help in several areas: selling tickets at the door, the education table, membership table, fruit tasting table, setting up Saturday morning, taking down Sunday after the show. It's a lot of fun and you get free admission. Where would you like to help out? Let someone know.

To volunteer call:

Set up or take down:	Orel Vallen	(206) 772-2119
Education Display:	Dick Tilbury	(206) 723-9009
Membership table:	Evelyn Troughton	(206) 282-6191
Door tickets:	Evelyn Troughton	
Tasting table:	To Be Announced in October	

Remember, many hands make light work. And this is a good way to get to know your fellow members.

REMEMBER THEN?

The **1997** Fall Fruit Show drew 632 interested people. There were 230 different varieties of apples displayed, 51 varieties of pears, six grape varieties, 5 varieties of nuts, 4 of kiwi, 3 quince, 2 pawpaw and one each of cherimoya, fig and lemon.

The **1996** Fall Fruit Show attracted 705 attendees. Members brought 216 varieties of apples for display, 39 varieties of pear, 9 grape varieties, 6 nut, 3 kiwi, and one each of fig, plum and quince.

1995, a "challenging" apple growing year, saw 251 apple varieties, 51 varieties of pear, 13 grape varieties, 7 varieties of nuts,10 kiwi varieties, 3 of figs, 2 quince and 1 persimmon. There were 701 attendees.

1994 Fall Fruit Show had 356 apple varieties with 125 new varieties, "a superior apple growing climate" said Dave Battey. There were 46 pear varieties, 2 of grape, 12 varieties of nuts, 3 of kiwi and quince, 2 of persimmon, one medlar.

What will 1998 bring?

1998 FALL FRUIT SHOW

SATURDAY OCTOBER 17
9:30 A.M. TO 5:00 P.M.

AND

SUNDAY OCTOBER 18
10:00 A.M. TO 4:00 P.M.
at
Tukwila Community Center
12424 42nd S
Tukwila

LOTS OF FREE PARKING
ADULTS $3.00
CHILDREN UNDER 16 FREE

SATURDAY PROGRAM

10:30 a.m.	George Pinyuh	Starting a Fruit Garden
1:00 p.m.	Bob Glanzman	The Latest on Kiwis
2:30 p.m.	Cisco Morris	Stump Cisco

SUNDAY PROGRAM

10:30 a.m.	Orel Vallen	Apple Maggots
1:00 p.m.	Kristan Johnson	Fruit Espaliers
2:30 p.m.	Scott Connor	Edible Landscaping

CONTINUOUS BOTH DAYS

FRUIT TASTING APPLE IDENTIFICATION MASTER GARDENERS

MEMBERS FRUIT EXHIBITS COMMERCIAL EXHIBITS

APPLE MAGGOT DISPLAY

COMPARISON OF LADD TRAPS, RED SPHERES, AND YELLOW PANELS for CAPTURING APPLE MAGGOT FLIES in COMMERCIAL ORCHARDS

from "Fruit Notes" Fall 1997 University of Massachusetts newsletter
Submitted by Dick Tilbury

In a recent study in commercial apple orchards, it was found that sticky red spheres baited with butyl hexanoate caught four times more apple maggot flies (AMF) than unbaited red spheres. However, not everyone agrees that baited red spheres are the best AMF trap. For example, studies carried out in the western U.S. seem to place sticky Ladd traps as being equal or superior to sticky red spheres. Ladd traps consist of a rectangular yellow panel with a red sphere in the center. The yellow panel is believed to attract immature AMF whereas the red sphere is believed to attract mature AMF. Trap position is critical for effectiveness. We speculated that Ladd traps in poor position could have been more effective than red sphere traps in poor position in studies favoring Ladd traps being superior. Finally, some of the studies on Ladd traps were not performed in commercial orchards, where incoming AMF populations are primarily composed of mature flies. To clarify conclusions on trap type effectiveness for AMF, we conducted the following experiment during the summer of 1997.

Material and Methods In nine rows of apple trees in a commercial orchard in Massachusetts, the first six trees in each row (that is trees nearest adjacent woods) were selected for use. In the first row, the first tree contained a red sphere (8 cm in diameter) placed in optimal position (surrounded by as much foliage and fruit as possible at a distance of 3-6 inches), in the mid-portion of the tree canopy. The second tree contained a red sphere in poor position (few leaves and no fruit nearby). The third and fourth trees contained a Ladd trap (9 cm diameter red sphere centered on a 9x11-inch yellow panel) in optimal and poor position, respectively. The fifth and sixth trees contained a yellow panel (9x11-inch rectangle) in optimal and poor position, respectively. For every succeeding row, trap positions were rotated so that each trap type appeared in each within-row tree position three times.

In every row, poor position was standardized for all traps, either low and out; high and out; or close to the trunk, high or low. A vial containing butyl hexanoate was placed 4 to 6 inches away from every trap. Traps were serviced every week for six weeks, during which flies were removed and counted and sticky was replenished if needed. The experiment was conducted from late July to early September.

Results Overall, red spheres in both optimal and poor positions and Ladd traps in optimal position caught similar numbers of flies and three times more flies than Ladd traps in poor position or yellow panels in either position. During the first three weeks, red spheres in optimal position caught numerically more flies than red spheres in poor positions and Ladd traps in optimal position; the difference, however, was not significant. During the last three weeks, as fruit reached maturity, red spheres in optimal position caught numerically fewer flies than red spheres in poor position and Ladd traps in optimal position; again however, the difference was not significant. Across all six weeks Ladd traps in poor position and yellow panels in either position caught significantly fewer flies than red spheres in either position and Ladd traps in optimal position.

Conclusions From late July to mid-August, red spheres in optimal position caught 35-40% more AMF than red spheres in poor position or Ladd traps in optimal position. The proximity of foliage and fruit to red spheres in optimal position probably facilitated more frequent opportunity for AMF to encounter such spheres. This could explain the numerical difference in capture between red spheres in optimal position versus red spheres in poor position. Yellow panels were comparatively unattractive irrespective of panel position. Ladd traps in poor position caught numbers of AMF similar to those on yellow panels. Apparently, in poor position, the red sphere component of a Ladd trap is not perceived as fruit by foraging AMF.

By mid-August, the Paulared apples on the trapped trees had turned red and visually competed with red spheres in optimal position. At times, red sphere traps in optimal position were difficult for us to find in the trees. at that point, red spheres in poor position (placed farther away form competing fruit) and Ladd traps in optimal position might have enhanced the contrast of a red sphere against background rather than red fruit. The effect could not be reproduced by Ladd traps in poor position.

Efficiency of red spheres for trapping AMF seems to decrease when fruit reaches a size and color similar to the spheres. This factor deserves more attention. Trap positioning may need to be adjusted toward harvest. We plan to conduct studies on the effect of fruit density on trap efficiency, an interfering factor that could affect management practices especially when early maturing cultivars of red apples are involved.

		Early (week)				Late (week)				
Trap type	Position in tree	1	2	3	Total*	4	5	6	Total*	Overall*
Red Sphere	Optimal	12	19	17	48a	12	13	22	47a	95a
Red Sphere	Poor	4	15	4	33a	26	13	26	65a	98a
Ladd	Optimal	8	13	14	35a	15	18	32	65a	100a
Ladd	Poor	0	3	9	12b	4	6	9	19b	31b
Yellow Panel	Optimal	6	3	9	18b	4	8	2	14b	32b
Yellow Panel	Poor	1	2	1	4b	2	1	3	6b	10b

* Numbers followed by a different letter are significantly different at odds of 19:1.

CRITIQUE by DICK TILBURY

In my opinion this comparison of apple maggot fly (AMF) traps is flawed: the yellow panel traps were not tested in their optimum configuration.

A vial containing butyl hexanoate was placed 4 to 6 inches away from every trap. Butyl hexanoate is a synthetic apple volatile attractant (emits a strong apple odor) and can increase red ball and Ladd trap captures by 4 to 6 times. It attracts the mature AMF to the red spheres when the female is looking for an apple to deposit her eggs.

But the butyl hexanoate lure does nothing for the yellow panel trap as these traps are an attractant primarily for immature AMF looking for a food source, (insect honeydew—bug poop and bird droppings. The literature suggests and Orel Vallen's and Gempler's yellow sticky traps do incorporate a food attractant lure, namely ammonium carbonate or ammonium acetate.

My guess is that the capture rate of the yellow sticky panels would have been roughly doubled if a food attractant had been used instead of an apple odor.

Our experience does parallel the conclusion of the article with respect to red ball and Ladd AMF traps. We find the capture rate of both traps to be comparable with a very slight nod to the Ladd trap, especially early and late in the season. The capture rate of red ball and Ladd traps with butyl hexanoate lures (Gempler's catalog No. R04101) is roughly double that of yellow sticky traps with ammonium carbonate bait.

One important factor in selecting AMF traps was not addressed in the article, namely the time involved to service the traps. I clean our AMF traps and replace the brush-on Tangletrap coating every two weeks. The red ball trap is easiest to maintain. The yellow sticky panel requires double and the Ladd type trap requires about four times the maintenance time of the red ball trap (see also Spring 1997 Bee Line, page 17 ff).

I may try the traditional formula Tangletrap coating insead of the brush-on formula to extend the service period of my Ladd type traps.. Insects will be removed with tweezers periodically to keep the trap surface clean.

NOTE: We deployed three yellow sticky panel traps baited with Orel's ammonium carbonate and one homemade Ladd trap with a butyl hexanoate lure on May 15. The first AMF, a female, was trapped June 7, 1998 on the yellow portion of the Ladd trap. This is three days earlier than date of first catch in past years.

SKAGIT COUNTY APPLES QUARANTINED

The Associated Press

Mount Vernon - State officials have quarantined Skagit County apples to safeguard against an outbreak of apple maggots.

That means Skagit County farmers could face extra expenses or not be allowed to ship apples outside the greater quarantine area, which includes almost all of Western Washington, said Mary Toohey, assistant director of laboratory services at the state Agriculture Department.

"It's a big deal," said Dyvon Havens, a Washington State University cooperative extension agent working with local growers. "It's potentially devastating to the industry unless we can keep the maggot out of our community and orchards."

The culprit - which resembles the common house fly - lays eggs in apples, turning them to mush as the larvae mature.

Orchards within a quarantine area must get free permits to ship their apples, Toohey said. If they are shipped to points within the quarantine area, getting a permit is no problem.

To ship apples outside the quarantine area from orchards where no maggots have been found within half a mile, getting a permit will be more time consuming, Toohey said. It may require certain conditions be met, such as covering the bins or putting the apples in cold storage.

If apple maggots are found within half a mile of an orchard, growers will have to pay for inspections to ensure that no maggots are in the orchard, she said. Those orchards would be designated "threatened."

Skagit County is the most significant Western Washington commercial apple producer. The county's apple industry brought in about $780,000 in 1996, the last year figures were available.

Last year, state investigators trapped apple maggots at 18 Skagit County sites, compared with three the year before. None were near an orchard.

Orchardists who discover a single maggot in or near an orchard must take precautionary steps, ranging from inspecting every apple to placing the entire crop in cold storage.

But Skagit County's relatively young industry would be ill-prepared in such an event. It has storage facilities for about 10 percent of its crop and ships all apples not sold locally across the Cascades to apple sorting and storage houses in Wenatchee or Yakima.

Skagit County is one of the last counties in Western Washington to receive quarantine status. Only Whatcom and San Juan counties have not been quarantined west of the Cascades.

Spread of the maggot could affect just about everybody with an apple tree.

"If we don't stop it, even the typical homeowner will not have any apples," Mount Vernon orchardist Don Williamson said.

This article appeared in the Seattle Times Sunday June 7, 1998.

NEWS FROM THE CHAPTERS

NORTH OLYMPIC FRUIT CLUB

Erik Simpson, president, reports that on July 18 members visited the Olympic Wilderness Apiary, located 4 miles west of Joyce. Judy and Dan Harvey met and showed them their commercial honey operation. Dan is breeding a feral Caucasian bee which is somewhat resistant to tracheal mite.

An orchard tour is planned for late September.

PENINSULA FRUIT CLUB

President Mike Shannon tells me they are planning their Fall Fruit Show for Saturday October 3 at the Westside Improvement Club.

He also said that Extension Agent Chris Smith has announced his retirement. Peninsula Fruit Club is planning an open house in his honor on August 3 from 2:00 p.m. to 4:00p.m. at Gibbins Community Center, 1026 Sidney Ave, Port Orchard. Chris has been the back bone of Peninsula for the past ten years. We wish him well.

SEATTLE TREE FRUIT SOCIETY

Summer tours have visited the Seattle Tilth Center in May; in June a "two fer" to Bellevue Master Gardener Demonstration Garden and members Pat and Bob Gerde's orchard. For July they have plans to visit David Conley's in Lynnwood. David grows persimmons, pawpaws and figs.

Seattle Tree Fruit Society will be representing WCFS at the Evergreen State Fair in Monroe on September 2nd, call Marlene Falkenbury (206) 522-2273 if you would like to help out.

TAHOMA CHAPTER

On July 2 their meeting was on food preservation. Planned for August 6 is exotic fruits for the northwest and the benefits of summer pruning. Tahoma meets at 7:00 p.m. at the United Methodist Church, 1919 Pioneer Ave SW.

Ed Jones reports on the Puyallup Spring Fair: "The spring fair this year had a little different twist. Rather than just a display we were allowed to sell plants. We tried it and really didn't like it. We would rather have a real nice display with education as our goal. We had been promised a 25' space, but when we arrived to set up, our space had been increased to 35' due to a couple of cancellations. We do have enough money to purchase another sign similar to our chapter sign that states something like 'all these plants and more can be grown in western Washington'."

The Puyallup Fair runs from September 11 to 27. WCFS will have a display for the entire fair. Your help is needed to man the booth. Free admittance and parking are given and it is fun. To offer assistance or more information, contact Don Stewart (253) 840-4257 or e-mail to hobbesdadog@sprynet.com.

THIS IS WHAT YOU WANT

Many of you return the survey with your membership renewals telling us what you want to see in the Bee Line. This is great for giving your editor ideas on what to include. This is what the 73 who returned the survey say:

Do you like the 2 column format?
yes-56; no-2; didn't notice -2; doesn't matter-11

What do you want to read about?
- new fruit tree introductions
- planning for fruit on small property
- pruning and grafting
- disease and pest (alternative) control
  - apple maggot, codling moth
- apples, apples for hard cider, berries
- pear cider
- summer apples for maritime weather
- new fruit varieties evaluation
- members growing experiences
- how to
- home storage of apples and pears
- organic growing
- pollination
- unusual little-known varieties
- container trees
- fertigation
- apple rootstock
- expected production by variety, rootstock
- short season apple variety trials
- summer apple tasting

How can WCFS help you?
- someone to call with tree fruit questions
- book and video tape recommendations
- more on grafting, how to articles, organic controls
- beginner column for new members
- five year index
- monthly to do calendar

What area do you have?
- city lot - 7
- acreage - 9 (1/2 acre to 5 acres)

In addition to the fruits listed you were interested in:
red currents, raspberries, gooseberries, grapes, asian pears, cider apples, fruits form other countries, crab apples, apricots, walnuts, and bees

Not every one responded to all questions. Many just wrote that they liked what they read and to continue in the same vein.

Now I need YOUR help. I need members to send information on these subjects. Tell us your experiences, good and bad; our new members can learn from your experiences.

Some of you are specialists in certain fields, let me know if you are willing to have your name listed so you can be contacted when someone needs help.

LETTER FROM LONDON

The Bee Line has been very well received in the UK by a few privileged fruit enthusiasts who have seen it, so much so that I have great difficulty in getting my copy back! Whereas we occasionally have the odd interesting article on say rootstocks, you have no less than four articles plus an editorial on dwarfing cherry stocks. We hope this trend continues. Although we once led the field in root stock development at the East Malling and Merton establishments it seems that these days have passed. Fortunately the baton has been taken up in Germany and Belgium to a certain extent, although amateurs over here have great difficulty in acquiring the newer stocks.

The UK is of course well known for fruit growing especially apples. Although fruit can be grown in most parts of the country there are certain counties especially favoured by soil and location and perhaps a short geography lesson here might be excused to familiarise you with the principal apple regions in UK:

—Parts of Kent, which lies just south east of London, are perhaps the most favoured having exceptionally good deep well drained sandy loams. Many fruit farms are located within this area, as is our National Collection at Brogdale near Faversham. Kent has traditionally supplied London with fruit and is sometimes referred to as the 'Garden of England.

—Herefordshire and Worcestershire, which lie, so to speak, just to the right of south Wales and south of Birmingham, also grow excellent dessert and cider apples (which you call hard cider).

—Somerset and Devon in the far southwest of England also grow good apples especially for cider. There are some excellent festivals in the fall when much powerful hard cider and local delicacies are consumed! (Not the bottled down rubbish but good old farm brews made in wooden barrels).

London and its suburbs where I grow my trees, mostly lie in the large shallow Thames river basin. The soil is mostly clays and gravels, not too bad for fruit growing, except perhaps for cherries. The climate is marginally warmer than the surrounding countryside. This spring there was no repeat of the devastating frosts of 1997 and following exceptional blossom and warm sunny weather a very good set of apples and pears was achieved. With almost no crop last year it looks as though we are heading for a bumper crop this year so if you are planning a fruit-led visit to the old country one of these days, this October would seem to be an auspicious time.

Fairly close to London we have the two premier fruit collections of the south of England namely the National Collection at Brogdale, Kent and the fruit gardens of The Royal Horticultural Society at Wisley, Surrey. Both are open daily to the public. At Brogdale there are short guided tours but at Wisley you can walk round unescorted at your leisure. If your editor wishes I can give more details of these establishments at a later date.

Jeremy Slane

Ed's note: You may remember that Jeremy Slane wrote to us after reading about our 1997 Fall Fruit Show in the Brogdale Newsletter (see Winter 1998 issue, page 11). His letter stated he would be pleased to be put in touch with one or two of our members to compare notes. This did happen and subsequently Jeremy joined WCFS. Now he has offered to submit a quarterly piece giving an update on what is happening in the UK.

Your editor is most grateful for this offer and welcomes it.

A little background on Jeremy. He is an amateur fruit grower on a small scale, a recently retired surveyor (due to heart problems) and now able to devote more time to his hobby.

On a recent trip to Yakima to attend the dedication of the Yakima Greenway's new Visitor Center I had the opportunity to visit the offices of Good Fruit Grower (it was right next door!) and met Jim Black, the managing editor. In the course of our conversation he mentioned that Geraldine Warner is an expert on apples and Melissa Hansen is well versed in stone fruits. I quote or use verbatum their articles.

Since Washington's Fruit Place Visitor Center was just downstairs I walked through and it is a great place to visit. The Visitor Center Interpretation Center hosts many a school child and has exhibits geared to their level of interest. I found them very enticing, in fact I "played" with some of the hands on displays! The walls were curved and showed orchards in the four seasons of the year. If you are in the area I heartily endorse a visit.

And the gift shop is something else, one of the best I have seen. If there is anything you want with a fruit theme, they have it. From refrigerator magnets to napkins, tablecloths, towels, pot holders and tote bags. Earings, gift wrap, bookends. Have you ever seen a tic-tac-toe game with yellow and red apples instead of an X or O? Or a checkerboard with red or green apples? Great gifts for someone who has everything! And all kinds of syrups, jams, jellies and vinegar. And recipes!

Beries in Wine Syrup

4 oz (3/4 cup) dried berries	1 cup red wine
1/4 cup sugar	2 strips lemon peel
1 Tbsp lemon juice	1 cinnamon stick

In medium saucepan, combine all ingredients. Bring to a boil, reduce heat, cover and simmer until berries are soft and plump, about 25 minutes. Cool, cover and chill at least one hour. Refrigerate up to 1 week. Serve berries with syrup in sherbet dishes or glass bowls. Makes about three servings.

NEW PEST CAUSES HAVOC IN ORCHARDS and WAREHOUSES

Good Fruit Grower May 15, 1998
by Geraldine Warner

A new pest is making a big impression in Washington's Columbia Basin and northern Oregon. The noctuid moth *Lacanobia subjuncta*—unheard of in Pacific Northwest apple orchards until about three years ago—caused major headaches for both growers and packers last season.

The caterpillars, which grow an inch and a half long, defoliated trees, excavated holes in apples, and caused havoc on packing lines after hitching a ride there in bins.

Dr. Peter Landolt, entomologist with the Department of Agriculture (USDA) in Yakima had many calls about the pest last season from desperate growers and packers. One caller reported that the caterpillars seemed to be irritated by some treatment at the warehouse and began moving and roaming around. Several packers said the caterpillars were so large they were gumming up the brushes on the line.

Timing The timing of their emergence was particularly unfortunate. The insect has two generations. First-generation moths fly primarily in June in the Yakima area, and caterpillars are active in July. Second generation moths emerge about mid-August, and by September, new caterpillars are growing rapidly and eating both fruit and leaves. Last season, when orchardists put out bins in preparation for harvest, large numbers of caterpillars crawled inside.

Dilemma Growers were caught in a dilemma, not being able to apply pesticides because of preharvest interval. Landholt recalls a Gala grower who realized he had a problem just a few days before harvest and had no options. "He knew he was in a bind because he had a big number of caterpillars and nothing he could find to do."

The big question is why this particular insect has suddenly appeared. Other noctuid moths, including cutworms and green fruit worms, have been reported in the Pacific Northwest before but have not been a major concern. Some species are harmless to fruit trees.

Landolt, who was transferred to the Agricultural Research Services (ARS) Yakima laboratory two years ago, soon became curious about reports of cutworms that he heard were damaging apple trees, and decided to raise some of the caterpillars to adults in the laboratory in order to identify them. He found that all the caterpillars sent in by growers who were seeing damage were *Lacanobia subjuncta.* He had two caterpillars sent in that were not that species, but they were not causing problems. Every time someone called and said they had cutworms defoliating their trees, or five percent fruit damage, or they were in a packing house, it was *Lacanobia subjuncta.* Landolt said this species is not strictly a cutworm, as it lives in the canopy of apple trees. Typically, cutworms feed on roots and shoots of plants and often cut off the plant at ground level.

This species may have been around sooner, he said, but no one had bothered to raise the caterpillars to adults to find out what they were. Landolt reared them in a lab and compared them with museum specimens to confirm their identity.

Little is known about the biology of *Lacanobia subjuncta,* which does not have a common name. It is found throughout North America and has a wide host range, including weeds, row crops, shrubs, and trees. In the Midwest, it may occasionally infest berry crops and cherries. It was known in Washington and Oregon, but had never before been found in apple trees.

Dr. Jay Bunner, entomologist with Washington State University in Wenatchee, said *Lacanobia subjuncta* has become a tremendous problem, and in the Columbia Basin and Tri-Cities area, has caused more damage than codling moth or leafrollers the last couple of years. Brunner is starting a research project to learn more about its life history and how to control it.

Hypotheses Landolt said there are two hypotheses as to why it only recently became a problem. One is that the past few winters, which have been wet, have enabled the insect to build up in large numbers, and when other vegetation dries out, it moves into irrigated crops. If this is the case, it would be infesting a lot of different plants, and if the weather turns drier, it would go away.

The other theory is that it is changing genetically and adapting to apples. This could have been happening for some time, since no one had bothered to identify caterpillars they were seeing in orchards as this particular species. "It's only when it reaches a critical status, or pest status, that anyone would be concerned," he said.

Landolt will be out sampling different kinds of plants this summer for *Lacanobia subjuncta*, on both rangeland and irrigated land. He'll look in weeds and other crops, as well as on fruit and foliage of apples. "The reason I want to go to all that trouble is if it's specifically adapting itself to apple, then we have a long-term problem which is not going to go away," he explained.

Landolt said the only commonality he has found between infested orchards is that they are mainly strung along the Columbia River. The insect was not a big problem in the Yakima Valley or the Wenatchee area.

The type of pest management does not seem to be a factor, and the worst infestations have not been in orchards using organic or soft programs. "It looks pretty clear that it's not connected to mating disruption. People who have sprayed repeatedly with Guthion and Lorsban would have a problem," Landolt said, noting that the insect could be developing resistance to organophosphates.

(Continued on page 9)

(Continued from page 8)

Misidentified Pest consultant Nana Simone of Prosser first saw damage from the insect three years ago at Vantage, but believes it was probably around before then but was misidentified. Since then, she has either seen it herself or heard reports of it at Mattawa, Prosser, Plymouth, and at Milton-Freewater, Oregon. She estimates that about 75% of the orchards she works with have infestations, but not at damaging levels. "There's no question, it's been an increasing problem, and it seems to be spreading in the state," she said.

Tom Darnell, Oregon State University Cooperative Extension agent based in Milton-Freewater, Oregon, said several growers in that area had serious infestations. "It was some of our better growers," he said, noting that the pest likes vigorous growth and new foliage.

The caterpillars only recently came to his attention. "If they had been around previous to the last two to three years, they were evidently feeding on foliage, because the damage on fruit is distinctive enough that someone would have hollered," he said. "They'll eat deep craters into the fruit, and a lot of times around the stem end. The larvae get to be a fairly good size, and the older instar larvae do a lot of feeding before they pupate."

Landolt believes the insect overwinters as a pupa in the soil, but he is still studying the insect's biology.

Monitoring Research and extension people are asking growers to be especially vigilant this season. Female moths lay 100 to 200 eggs, so populations can increase a hundred fold in a generation if they are not controlled. Phermone traps can be used to monitor adults, but they only indicate timing of the pest's emergence and development, and do not reflect populations or potential damage from caterpillars.

"What we want to do is just get growers and fieldmen to do a really good job of monitoring," Darnell said. "If you have them in your orchard they're fairly easy to find. They like to feed on foliage on vigorous growth in the top of the trees. We just used a beating tray and hit the limbs, and it was like a hailstorm out there."

Whereas some cutworms move between the cover crop and the trees, *Lacanobia subjuncta* stays in the trees, and tends to be found in the tops and on outer branches. Infested trees can look extremely ragged, Landolt said. "I've been in several orchards where they still have leaves on, but at a great distance they look like they're all chewed up," he said.

Control The best way to control them has yet to be determined. Landolt said there are products specifically for cutworms but they are only registered on other crops. Darnell said some of the tree fruit pesticide growers have used have been disruptive to soft programs.

"That's one of the things we want to find out this year," Darnell said. "What is the most effective? And since they do feed heartily on foliage, we're going to assume that Bts [*Bacillus thuringiensis*] should control them. If a softer chemical will work, that's what we want to go with."

He said leafrollers are becoming resistant to organophosphates, and pesticides based on newer chemistries may be available soon. "We're interested in finding if they're going to be effective," he said.

Simone suspects that one reason the insect has not been controlled by organophosphates is that its life cycle does not coincide with that of codling moth. Caterpillars are active between the times when growers typically spray for codling moth.

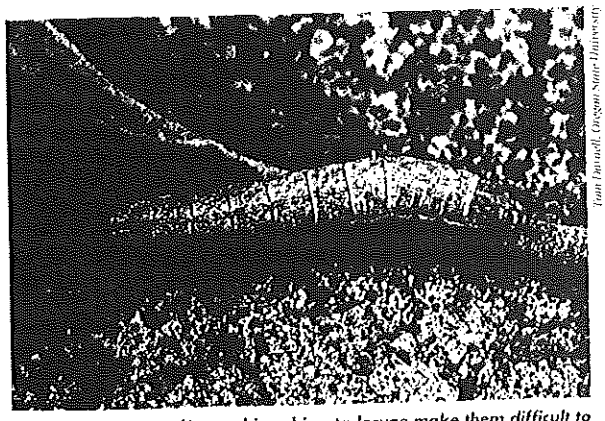
Similarly, the first generation larvae emerge before the summer generation of leafroller larvae, so leafroller controls are not effective. In her experience, Bts sprays are not toxic to the caterpillars even when timed properly.

Cold treatment Dr. Lisa Neven, insect physiologist with the ARS in Yakima, is studying the effect of cold temperatures in storage on the caterpillars. Short-term exposure to cold in the laboratory has little effect on them, she said, but packers want to know if long-term cold storage will kill them.

"They were bringing in fruit from the field that were crawling with larvae, and from the descriptions, it sounded pretty nasty," she said. The number of larvae in some bins was so high that they gummed up the packing line, she said, and a couple of packers shut down their lines to get rid of all the caterpillars that were running around.

"So what they wanted to know was, if they put it into cold storage right away would they all die?" she explained. If they were killed, the caterpillars would be much easier to deal with in the packing plant, she added. "A dead insect's easier to work with than something that's crawling around."

But Neven said so little is known about the species that she is not sure what stage it overwinters in, whether it has a preferred overwintering site, and whether it goes into diapause. She is planning tests to find out how the larvae react to long-term cold storage.



Tom Darnell, Oregon State University

The varying colors of Lacanobia subjuncta larvae make them difficult to identify. The larvae can be green, tan, or orange, depending on age.

THINNING TREE IMPROVES SIZE AND QUALITY OF FRUIT

BY Gary Moulton and Jacqueline King

A fruit tree in spring covered with flowers is a beautiful sight, yet most people don't realize that if just 5% of all those spring flowers set fruit, it will be enough to provide a full crop. Too many fruits on a tree means fewer cells for each fruit, which translates into smaller fruit that is often poor quality. Timely thinning of excess fruit increases the number of cells per fruit and maximizes the potential fruit size. Thinning also improves the tree's productivity in the year to come.

When is the best time to thin the fruit? The earlier the better. In the 30 to 40 days immediately after flowers are pollinated, the newly set fruit undergoes rapid cell division and growth. Since the total number of cells determines the potential size to which the fruit can grow, it is important to thin fruit early so that the ones that remain will have more cells and can grow bigger as they mature.

Also, early thinning promotes the development of fruit buds for the following spring's bloom. The fruit buds that develop this summer will determine next year's crop. The presence of seeds, even the immature seeds in the current year's fruit that is just forming, will inhibit the formation of flower buds for next year. By thinning early and heavily, the total amount of hormone produced by immature seeds is greatly reduced.

Leaving all the fruit unthinned till late in the season often means there are fewer buds to produce fruit the following year. Trees can get into a cycle of alternate bearing, overloaded with fruit one year, and cropping very poorly in the following year. Some varieties such as Gravenstein are very prone to this. In a heavy bearing year, removing half or more of the blossom clusters at bloom time can help reduce the problem in varieties with this tendency.

In thinning, remove the smaller fruits and leave the larger ones, because the smaller fruit have fewer cells and will remain relatively smaller even after thinning. Remove fruit with disease spots, hail damage, or other defects. Keep in mind the size that fruits will be at maturity and leave enough room so that fruits won't crowd each other along the branch. Aim for an even spacing as much as possible. Some varieties, called tip-bearing, often have fruit clustered at the ends of long shoots. In this case it may be necessary to keep two fruits together in the end cluster if the rest of the branch is bare.

Apples, pears and Asian pears almost always need heavy thinning. Apple varieties that bear heavily year after year can be thinned at the bloom stage. The king bloom, in the center of the bloom cluster, is the first to open and produces the biggest fruit. Remove all the other flower buds on that spur, then after fruit has set, check back and thin again where spurs are too close together. A good spacing for apples and pears is one fruit per 6" of branch. Asian pears should be spaced at one per 6 to 8" and fruits that are joined together should be removed.

Plums, especially European plums such as Italian or Stanley, often need thinning when fruit set is heavy. They can be spaced somewhat closer depending on the size of fruit.

Apricots in our area do not need to be thinned in most years. Cherries don't need thinning.

Fruit thinning is the key to producing good size fruit of high quality, but other factors are also important. Be sure to provide plenty of water during the season when fruit is ripening, particularly if it is a dry year as good watering helps increase fruit size.

Serious stress on the tree can adversely affect fruit quality or even cause some to drop.

Fruit trees repay good care by providing the gardener with an ample harvest of ripe, tasty fruit just as beautiful to the fruit enthusiast as the flowers of early spring.

Old Time Apples

Dan A. Hoover

When summer sun like polished brass
Cured clover hay in scorching air,
We climbed our Early Harvest trees
For mellow apples lurking there

Or spliced our fish poles in a plan
To knock the striped Astrakhan;
Yellow Transparent lured us too
For fruit-bait goodness overdue.

On August noons, wheat-threshing crews
Lay resting under maple shade;
We found the streaked Sheepnose ripe
And filled straw hats with every raid.

With autumn days of bronze and gold,
As cobwebs floated on the breeze,
A host of old-time favorites bowed
The boughs of family-orchard trees.

Wolf River's heavy, flattened fruit,
The Duchess and Bellflower's spice,
Red Wealthy's mealy, tempting bite
Made apple-eating paradise.

Now new kinds ship and rarely bruise
To sparkle bright on Produce Row
But lack the subtle flavor thrills
Of orchard tastes we used to know.

JUMPING SPIDERS ATTACK IN ORGANIC ORCHARD

Jumping spiders—spiders that don't make webs, but hunt their prey—are showing up fairly frequently in organic orchards in Washington State.

Jumping spiders, which are the Salticidae family of spiders, can be distinguished from other spiders by their four big eyes on the face and four smaller eyes on the top of the head. Their excellent vision allows them to hunt somewhat like cats. They can see prey from a distance, creep stealthily up to it , and then pounce. A jumping spider can jump more than 50 times its body length.

Eugene Miliczky, a research assistant at the U.S. Department of Agriculture's laboratory in Yakima, is working with research leader Dr. Carrol Calking on a two-year study to find out what types of spiders inhabit orchards and what they eat. During the 1996 season, Miliczky surveyed three different types of orchards: organic, conventional, and orchards in the USDA's Codling Moth Areawide Management Project (CAMP) at Parker.

Jumping spiders were the most common spider he found in organic orchards. They do not make webs to trap prey, but they do spin silk threads, using them as a drag line in case they fall. "They kind of stalk their prey when they see something suitable and make a stealthy approach, and when they get within range, they jump on the prey," Miliczky explained.

Jumping spiders come in a range of sizes, but those that he has found in organic orchards are relatively large and belong to the genus *Phidippus*. They are usually black with red markings, and the body can be almost half an inch long.

In one organic orchard, he saw a spider sitting on an apple eating a full-grown earwig. "They're capable of attacking good-sized prey," he said.

Miliczky said he is rearing some in the lab and feeding them codling moths. He said they will eat beneficial insects as well as pests, and even other spiders.

Another type of spider that is fairly common in organic orchards is the lynx spider. Lynx spiders, which belong to the Oxyopidae family, are also hunting spiders and have fairly good vision. Miliczky said he has been seeing one, or possibly two, species out of the 12 that are found in North America. Lynx are smaller than the jumping spiders, with a body length of about 1/4 inch. They are brown and have fairly long legs. They also jump, bur more often to escape rather than to attack.

Miliczky has also seen crab spiders, which belong to the Thomisidae family. They are often cryptically colored and are not hunters. They will sit for a long time waiting for prey. The front two pairs of legs are longer and stronger than the two hind pairs, and when something of interest comes along, the spider will grab it with its front legs.

He's also seen small spiders about 1/12 inch long or less, which makes webs. Typically they will make irregular webs across the upper surface of curled leaves, which trap lots of small insects such as aphids, leafhoppers, and adult leafminers, as well as some beneficial insects like wasps. They may also make webs among the petioles of leaves growing at the end of a branch or spur.

The larger spiders are rarely found in conventional orchards, where they presumably are killed by insecticides. Miliczky took 25 beating tray samples, each from a different tree in the orchard, and in conventional orchards, he typically found a spider in two, three, or four of the samples, and they tended to be small.

In organic orchards, he would find a spider in almost every sample. In the CAMP orchards, the numbers were somewhere in between.

He noticed that jumping spiders become more prevalent in the latter half of the growing season, whereas lynx and crab spiders showed up more often earlier in the season. He never saw any black widow spiders or aggressive house spiders in any of his samples.

He has also been taking sweep net samples in the cover crop, and said results are variable from orchard to orchard, depending largely on how much vegetation is growing. "Where the vegetation is denser and taller, I think I do see more spiders, and it tends to go along with the organic orchard instead of conventional," he noted.

Although spiders will eat beneficial insects as well as pests, Miliczky said he believes they do work to the orchardist's advantage overall, but he hopes to glean more information about their feeding habits in 1997, the second year of the project. "I would certainly think that you're probably better off if you have a good number of spiders in your orchard, because they're going to feed on the pest insects," he said.

Dr Larry Gut, entomologist with WSU in Wenatchee, said jumping spiders are his favorite animal in the orchard. They are aggressive, but do not bite humans.

Worldwide there are about 5,000 species of jumping spiders, and Gut estimated there are about a dozen in unsprayed pear orchards. "When you get into situations where there's lower use of pesticides they become pretty abundant in the trees," he said. Gut said they may play an important role in biological control of pests because of their hunting habits. "They respond to prey that's running around them, and they really go after it."

This article appeared in the December, 1996 issue of Good Fruit Grower.

NOW IS THE TIME FOR BUDDING

CHIP-BUDDING

From Plant Propagation by Phillip McMillan Browse

Chip-budding is perhaps the easiest way to bud a plant as it involves relatively few actions and, more importantly, it provides greater cambial contact between rootstock and scion than T-budding. A "chip" of bark and wood is removed from the rootstock and replaced with a "chip" of similar dimensions carrying a bud from the plant to be propagated.

For your bud, choose a shoot of current year's growth, of similar diameter as the rootstock so that it is easy to match cuts, and with well-matured buds, at least toward their base. Discard the top growth and carefully remove all the leaves flush with the stem. See figure 1.

Make a 1/4" cut down into the rootstock stem, at an angle of about 45°. Start a top cut 1 1/4" above the lower cut and angle it down to join the basal cut; remove the chip. See figure 2.

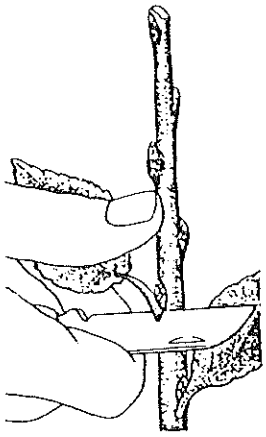
Select a stem, or bud stick, that has a similar diameter to the rootstock so that it is easy to match the cuts.

Make exactly similar cuts on the bud stick as on the rootstock, ensuring that a bud is included midway down the chip. See figure 3.

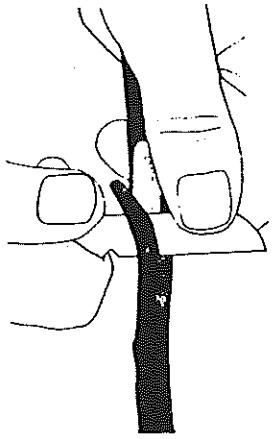
Tuck the bud chip into position on the rootstock and wrap with polyethylene tape, overlapping the tape so that it seals the chip completely. Then label. See figure 4.

After 3 to 4 weeks the bud will have united with the rootstock and the tape can be removed, so allowing the bud to swell. See figure 5.

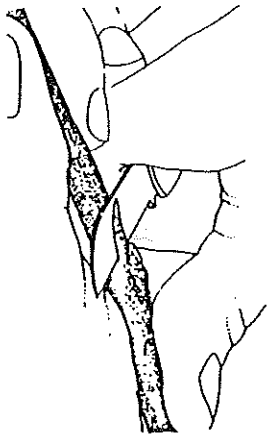
Cut back the top of the rootstock close above the bud in winter. The bud will grow out the next season. Figure 6.



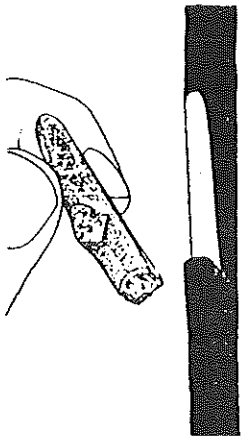
1 **Discard** the softer top growth on each bud stick. Remove all the leaves flush with the stem.



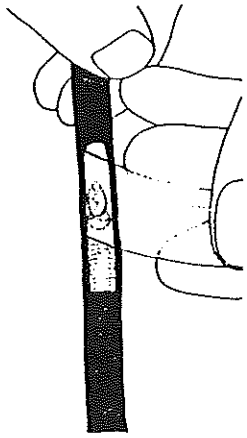
2 **Make** a ¼ in cut down into the rootstock stem. Slice down to it from 1¼ in up the stem. Remove the chip.



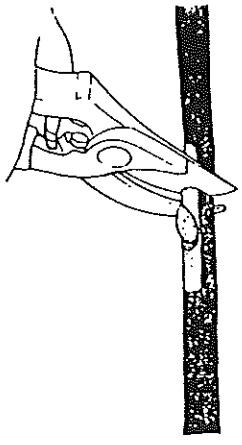
3 **Make** exactly similar cuts on the bud stick, ensuring that a bud is included midway down the chip.



4 **Tuck** the bud chip into position on the rootstock. Cover the chip with clear polyethylene tape; then label.



5 **Remove** the tape once the bud has united with the rootstock.



6 **Cut** the rootstock right back, close above the bud, in winter. The bud will grow out the next season.

T-Budding

From Plant Propagation by Phillip McMillan Browse

T-budding (a.k.a. shield budding) is a traditional way to propagate a plant. A bud from the plant to be propagated is placed behind the bark of the rootstock so that the back of the bud and the exposed surface of the rootstock wood are in contact. However, this technique can only be carried out when the bark of the rootstock lifts easily; the best time is July and August.

Make a T-shaped incision through the bark by cutting a horizontal slit and then a vertical downward incision sufficiently large to take a suitable bud. The taut bark will begin to spring away from the wood underneath. Loosen the two flaps slightly to receive the bud. figure 1.

The budding material should be the current year's growth with plump, healthy buds. Remove the leaves, but retain about 1/2" of each leaf stalk attached to the stem. Always select buds from the middle of a stem where the buds are mature. Do not take them from the bottom of the stem because they may be latent, nor from the top where they will be immature. Figure 2.

Cut shallowly into the stem about 1/4" below a mature bud-figure 3; when past it, lift off the bud together with a tail of bark. Ensure the cut is deep enough to avoid damaging the "eye" of the bud. Figure 4.

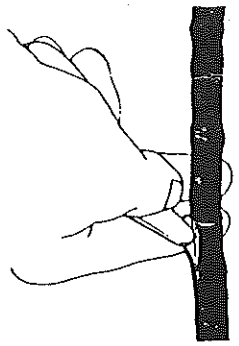
Remove any wood from under the bark by bending the bark outward and flicking the wood out. If the bud trace comes out with the wood, the bud is not mature and should be discarded. Figure 5.

Using the leaf stalk as a handle, slip the bud into the T-cut on the rootstock, and trim off the tail flush with the horizontal cut. Figure 6.

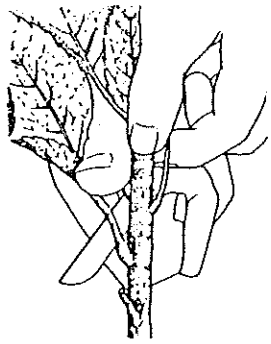
Wrap the budded rootstock with clear polyethylene tape, leaving the bud and leaf stalk exposed, and label it. (Some very successful with T-budding prefer to use elastic bands, snugly wrapped over the polyethylene to further ensure a "take", removing it after 2 weeks). Figure 7.

After 3 to 4 weeks the bud will have united with the rootstock and the tape can be removed. Figure 8.

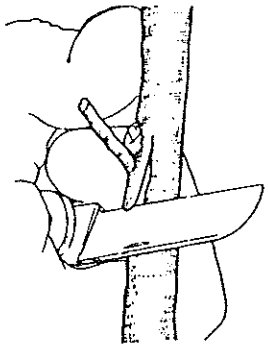
In late winter/early spring, cut back the top of the rootstock to just above the bud, which will then grow out during the following spring. Figure 9.



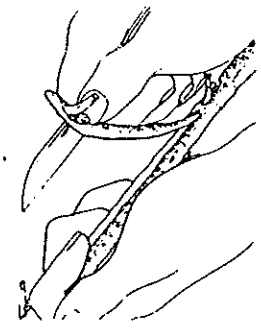
1 **Make** a T-shaped incision through the bark. Loosen the two flaps of bark.



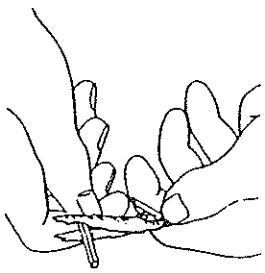
2 **Remove** the leaves but retain ½ in of each leaf-stalk on the stem.



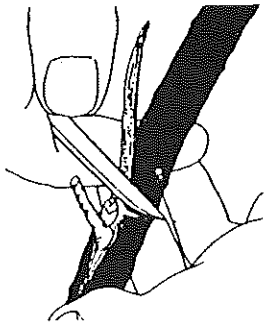
3 **Cut** shallowly into the stem about 1 in below a mature bud.



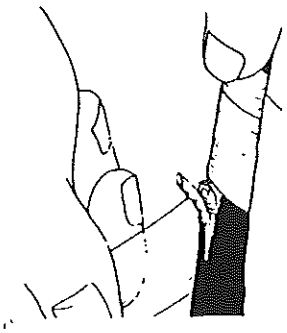
4 **Cut** shallowly underneath the bud. Lift it off once the knife is past it.



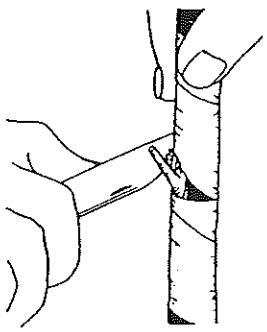
5 **Bend** the bark outward and flick out any wood underneath the bark.



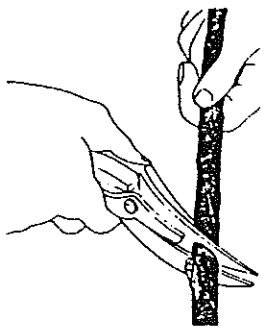
6 **Slip** the bud into the T-cut on the rootstock. Trim the tail neatly.



7 **Tie** with polyethylene tape, leaving the bud and leaf stalk exposed. Label clearly.



8 **Remove** the tape once the bud has united with the rootstock.



9 **Cut back** the top of the rootstock in late winter/ early spring.

GROWING ORGANIC

ORGANIC ORCHARD REQUIRES EX-PILOT'S PERSEVERENCE

Instead of retiring to a life of leisure in a warm climate, airline pilot John Sullivan decided to establish an organic orchard in eastern Washington on land that nobody else wanted, with no power supply.

Two years into the project, Sullivan is still enthusiastic, even though he said he's working harder than when he was employed as a pilot.

Both he and his brother, Paul, have taken up farming as a retirement occupation. His brother used to run a farm equipment manufacturing company in Pasco, Washington. He bought an 80 acre orchard at nearby Burbank, and found it suited him so well that when the Burlington Northern Railroad put a 600-acre piece of land up for sale on the south side of the Snake River, not far from Pasco, he decided to expand. The land was open range, with hills and craters that were formed during World War II when it was used as a bomb testing site.

"If you'd seen this farm before he started, you would have said there was no way to farm it," Sullivan confided. "When he bought this piece, nobody else would look at it. It would have been a 20 year payback. He bought a scraper and bulldozer and started leveling it himself. He worked on it for several years."

Sullivan said it was a combination of the challenge and the low cost of the land that motivated his brother. It cost a fraction of the going rate for irrigated land in the Columbia Basin, which can be up to $4,000 an acre. He noted that most orchards are handed down from generation to generation, and since their father was an engineer with the Boeing Company, he and his brother had to look for another way to get into farming.

Eventually, Paul was able to make a wheat and potato farm out of the land, but one corner, on a north-facing slope next to the river, was too rocky for row crops. That's where John decided to sink his retirement money and establish his orchard.

For about five years before he retired as a captain with Northwest Airlines, John had been studying fruit growing and reading all he could find on the topic. He'd always wanted to be a farmer and had a four-acre garden and 30-tree orchard at his home at Maple Valley, near Renton, Washington. He grew up in the Kent Valley, which at one time was a prime agricultural region, but is now a suburb of Seattle. His wife Sandy, who grew up on a farm in Louisiana, is also a pilot and was a crop duster.

The couple planted their first two acres of trees at the Snake River site in 1994. For three seasons before, they grew triticale, and disked it in, to improve the soil, which had a pH level of between 8.3 and 8.5 and less than 0.1% organic matter. "Our biggest struggle is that it's just sand," Sullivan said. "If you're going to grow conventionally, all you need to do is put water and fertilizer on, and things will grow. If you're farming organically, you have to come up with some innovative ideas."

Most of the trees he planted the first two years were Fuji, with Gala every tenth tree as pollinizers. After planting, Sullivan laid mats of alfalfa in the tree rows. The alfalfa acts as a mulch to keep the soil moist and stop weeds growing. Weed control is one of the greatest challenges in organic production. because chemical herbicides cannot be used. The alfalfa is also a cheap way to add nutrients to the soil.. Sullivan used waste alfalfa that he got either free or very cheaply from farmers. The fact that it had been rained on or otherwise spoiled only made it better for his purposes, as it was already beginning to decompose.

"The beauty of alfalfa is, it's loaded with nitrogen, and it breaks down rapidly," he said. "It's a beautiful product for an orchardist."

Between the rows, he planted grass, which he classes among the mistakes he made at first. "The grass takes a horrendous amount of water and moisture out of the soil," he said, explaining that he plans to lay a tarp over it this winter and smother it, since he can't use herbicides, and replace it with alfalfa. An alfalfa cover crop has worked well in his more recent plantings and has cut water usage by half, he said.

The drawback to alfalfa is that it is a host for lygus bugs, which can move up into the trees and attack the fruit. Sullivan said he's seen only early season damage, and he was able to thin off damaged fruit. He plans to mow the alfalfa and blow it under the trees to eliminate the backbreaking job of laying the mats of alfalfa under the trees.

Sullivan has been experimenting with various soil amendments. He started out with a pelletized formula designed to reduce the pH level, and then added blood meal for nitrogen. "It's very costly, and that's why I'm trying to develop something that's less costly—something I can make myself and do myself," he said.

This season, David Granatstein, farm improvement director with the Food Alliance, has been monitoring the performance of a new block of trees, under three different nutrient programs. The Food Alliance is sponsoring on-farm research projects, with the aim of expanding the use of sustainable agriculture systems.

A third of the trees in the test plot have been treated with a product called BionSoil, which is an odorless, processed cow manure that has the texture of peat moss. It adds nitrogen, phosphorus, potassium, and micronutrients to the soil. Another third of the trees have been treated with a combination of BionSoil, ground-up fish, and waste alfalfa.

The rest have been treated with waste alfalfa and a pelletized organic fertilizer formula.

Sullivan got the fish from a carp shoot in some ponds near Pasco, which was organized by the Traditional Archers of Washington, a group to which he and his wife

belong. Members shot the carp with bows and arrows in an effort to reduce the population of carp, which spoil the environment for other fish and waterfowl. Sullivan filled a trailer with the dead fish, ground them up, and mixed them in a pit in his orchard with waste alfalfa.

"It was pretty stinky here for about three months," he recalled. "It was pretty grim. The trees liked it though. Even the native people in this country have used fish as a fertilizer for hundreds of years with good results. It's a waste product that's readily available and inexpensive."

Although the results are not yet in, the trees treated with BionSoil alone and those treated with the BionSoil, fish, and alfalfa mixture look to be thriving well, while the trees that received the pelletized formula are noticeably weaker. Sullivan plans to apply BionSoil to the entire orchard next season, as he believes it helps make nutrients more available to the tree roots.

Making sure the trees receive enough water as well as nutrients has been one of the greatest challenges so far, he said. Evaporation is high because of the hot climate, and water leaches through the sandy soil. As a result, the trees can quickly become stressed. "As soon as you get behind it, you're in trouble," he said. "Water has been a big problem for me.."

Sullivan said he decided to grow fruit organically because of his aversion to pesticides, and he is trying to avoid spraying even those products that are allowed in organic production. He's used mating disruption for codling moth, and has seen no sign of leafrollers, but leafrollers have been a problem.

He's released hundreds of thousands of ladybugs in the orchard to control aphids, and supplemented the natural population of green lacewings and praying mantis, Jumping spiders, which are beneficial spiders in the Salticidae family, which feed on aphids, leafhoppers and other pests, turned up in the orchard on their own.

Sullivan said that less than 0.1% of the fruit has been damaged by pests. "I've probably seen three moths in my traps year long."

Still, Sullivan said an organic program isn't an easy one to follow. "It's a challenge. I knew it would be more difficult. I had no idea it would be four times more difficult, and that's what it is."

Sullivan said the fact that about 65% of his trees are Fuji has added complications, and one of his mistakes was planting so heavily to that variety. He's used evaporative cooling to avoid sunburn, but found the additional water created ideal conditions for diseases to develop, which is something to avoid in an organic orchard. He bagged about 20,000 Fujis this season, with the aim of producing blemish-free fruit, but will feel lucky to break even.

He's also had trouble keeping away the birds, which show a distinct preference for Fuji. "Pheasants, starlings, and magpies consistently plague me," reported Sullivan, who said scare tactics such as reflective tape and hawk-face balloons are only temporarily effective. "Now, they go 'ho-hum,' and they come right in."

Sullivan said he's planted his last Fuji tree. "I see all the money people are making with Fujis, and its a wonderful apple, but it's a poor tree. If I had to do it over again, I would not grow any Fuji. I know a lot of growers say that, but I mean it. For an organic grower, it's a nightmare. They're susceptible to every disease and problem you can think of."

He's planted a few rows of several new varieties, and has concluded that Ginger Gold is too risky because of its susceptibility to mildew. He's not optimistic about Pink Lady's prospects in the marketplace because of its tartness. He said friends and prospective buyers have turned their noses up at the samples he's offered them. "People who raise them say you have to put them in storage," he said noting the difficulty that presents for him, as he has no plans to take his fruit to a warehouse. The Sullivans pick their fruit into 25-pound boxes in the orchard and truck it themselves directly to buyers in Seattle.

The one variety Sullivan is excited about is Cameo, which he finds easy to both grow and sell. "It's probably the easiest tree—that, along with the Gala. For organic growers, they're a godsend. They grow like mad, and thrive in the poorest soil. Cameo is everything a Red Delicious wishes it was, and isn't," he proclaimed.

So far, the Sullivans have been living in a trailer at the orchard and returning to their Maple Valley home on weekends. they have a small plane that they use when weather permits, which cuts a 4 hour drive to a 1 hour flight.

They hope next spring to build a house at the orchard. It will be a Santa Fe-style home, made out of straw bales. Like the farm it will be solar powered. When Sullivan inquired about getting a power supply to the orchard, he was told it would cost $10,000, and another $10,000 to bring power to the hill-top home site. At that point, he was what he calls "electrically illiterate, but after reading up on it, he figured he could build his own power supply using solar energy.

He has a panel of photovoltaic cells on a hill next to the orchard facing due south. The panels produce 12-volt electricity, which is converted in his power center in the barn into 120-volt alternating current. A bank of 16, 8D batteries stores power for evenings and cloudy days. He is in the process of building a wind machine which will generate power in the evenings when solar power is not produced.

His system produces enough electricity for heat and appliances in the trailer, the irrigation system and pumps. Although they have adequate power, and a generator as a backup, knowing it is limited has made them a little more frugal with electricity.

The system cost $13,000 to build, but there are no monthly charges or bills. Maintenance consists of topping off the batteries with water once in a while.

RUSSIAN STONE FRUIT ROOTSTOCKS

There are some promising materials being developed at the Vavilov Research Institute's plant breeding station at Krymsk, Russia. A recent article in Good Fruit Grower, May 15, 1998, written by Geraldine Warner, reports that the material includes several fruiting varieties of Myrobalan, which is sometimes known as cherry plum, as well as stone fruit selections that may have potential as rootstocks.

Two members of the North American Fruit Explorers (NAFEX), Jerry Lehman of Indiana and Hector Black of Tennessee, visited the station in the early 1990s to arrange exchanges of plant material and personnel. Lehman is a retired phone company executive who breeds persimmons and Black runs an edible-landscape business.

They brought back budwood of several varieties which was sent to the U.S. Department of Agriculture's plant protection and quarantine program in Beltsville, Maryland, for virus testing. Most have been cleared.

Testing

Three Russian myrobalans will be tested this spring in very small quantities under a propagation-control agreement which prevents them from being grown on a commercial scale until they are patented.

Black, who has seven-year-old trees, describes the myrobalans as having a nice, spreading growth habit, somewhat like Japanese plums. They are early bloomers and are quite prolific if frost damage can be avoided. The variety, *Neberdzhaiskaia ranniaia,* is purported to be a large tree, but Black said all three are quite compact in his orchard. He adds that he farms organically and the orchard is in a frost-prone area, so this situation does not make for good testing.

Myrobalans are popular in Russia and eastern Europe but not in western Europe. Its appeal in eastern Europe is that it can be grown with less inputs than other types of fruit, plus it contains large amounts of vitamin C. This is important to consumers in areas that don't grow citrus.

The fruit, described as a cross between an apricot and a plum, is not expected to become very popular in the United States. Its main appeal would be to hobbyist fruit growers and those with roadside stands.

Cherry Rootstocks

However, there is interest in dwarfing cherry rootstocks. In the spring issue we had information on two German dwarfing cherry rootstocks, Gisela and Weiroot.

Now from Russia comes four cherry rootstocks, two of which are being tested for sensitivity to common cherry viruses at Prosser: VC-13, a cross of the Vladimirskaya cherry and *Cerapadus michyirin*, which reduces growth by 25%, and the VSL-2, a cross of *Prunus fruiticosa* and *Prunus lannesiana*, which is the most dwarfing, reducing the tree size by 50% to 60%.

Several of the German Giessen rootstocks proved hypersensitive to the pollen-borne prunus necrotic ringspot and prune dwarf viruses when put through similar tests at Prosser. And the Giessen cherry rootstocks that proved the most sensitive were the most dwarfing ones, which had *Prunus fruiticosa* in their parentage.

There is also a fruiting myrobalan called the Cuban Comet, in addition to two myrobalan hybrids that show promise as rootstocks for peach, cherry and plum.

Cuttings

An important advantage the Russian rootstock has over Giessen rootstocks is they can be propagated from cuttings, which is much cheaper and faster. Giessen rootstocks are difficult to propagate and are multiplied through tissue culture.

Another advantage of all the Krymsk material is that it was bred for disease and pest resistance. And they are likely to be more drought tolerant as the trees grown in Russia are not irrigated.

There is no proof yet that the Russian cherry rootstocks would be superior to the Giessens. If the material does not live up to expectations, it could be a source of genetics for further breeding.

Dr. Robert Anderson, horticulturist at Cornell University, New York, who has also visited the Russian station, says, "The reason we're excited is that Gennadiy (Gennadiy Eremin, director of the Krymsk station) used many different stone-fruit parents that are much different than anybody in the United States—or even western Europe—has used. And the reason that's so significant is we're coming into an area where everyone expects we're going to have to stop fumigating the land and have natural tolerance to pests. We think they are going to be cold hardy and tolerant of many soil diseases."

Anderson also said that the rootstocks were bred for that purpose in Russia, but it remains to be seen whether they perform the same in the various regions of the United States. "We're quite optimistic some of them will be winners and will be useful, but the United States itself has so many different climates to try things in, we don't know which would be good."

RUSSIAN STONE FRUIT VARIETIES, ROOTSTOCKS

Myrobalans

The following have cleared quarantine

Neberdshaiskaia ranniaia (1ER). Matures late June in Russia. Small, dark red fruit with yellow flesh. Firm and sour. Stone separates easily. Average flavor. Good for processing as preserves. Grows to 30 feet in Russia. Vigorous and high yielding. Hardy to zone 6. Disease resistant.

Kubanskaia Kometa (Cuban Comet) (3KC). Matures in early June. Dark red fruit with yellow, juicy flesh. Cling stone. Good, mild sweet-sour taste. Grows to 10 feet. Productive and disease resistant. Hardy to zone 5. Crops in the third year. Moderate drought resistance.

Zhemchuzhina (Pearl) (2P). Purple fruit with pink flesh that deepens to red after cutting open. Stone separates easily. Good, mild sweet-sour flavor. Grows to 15 feet. Productive. Hardy to zone 6. Average resistance to diseases.

Rootstocks for Sweet and Sour Cherry

The following have cleared quarantine in the U. S. and are being tested at Prosser for virus sensitivity.

VC-13 Reduces growth by 25%. Does not sucker. Resistant to diseases. Winter hardy. Propagated by green cuttings and layering.

LC-52. Reduces growth by 25 to 30%. Does not sucker. Resistant to root diseases. Moderate hardiness. Easily propagated from green cuttings and air layering.

L-2. Reduces growth by 25 to 30%. Does not sucker. Resistant to root diseases. Moderately hardy. Easily propagated from green cuttings.

VSL-2. Reduces growth by 50 to 60%. Does not sucker. Resistant to root diseases. Extremely winter hardy. Propagated from green cuttings and air layering.

Rootstocks for Other Stone Fruits

VVA-1 (*Prunus tomentosa x P. cerasifera*). Good compatibility with plums, apricots, and peaches. Makes a tree about 60% of a seedling. Good anchorage. Resistant to humidity and root diseases. Winter hardy. Propagated by softwood and hardwood cuttings. Cleared quarantine at Beltsville and being tested at Prosser for virus sensitivity.

Kuban-86 (*Prunus cerasifera x P. persica*). Strong growth. Resistant to root diseases. Does not sucker. Tolerant of high summer temperatures. More productive than seedling peach, plum, or myrobalan rootstocks. Winter hardy. Propagated from softwood and hardwood cuttings. Going through quarantine at Prosser.

ROOTS TELL THE PLANT ABOUT SOIL CONDITIONS

Plants speed up or slow down their growth in response to signals about the soil environment that are sent by the roots to the shoots.

Plant psychologists have uncovered increasing evidence that root tips launch these signals—as hormones and other chemicals—to inform shoots and leaves about the soil's water, nutrient supplies, hardness, and temperature, according to U.S. Department of Agriculture Agricultural Research Service (ARS) biophysicist Dr. Robert M. Aiken.

He and colleagues at ARS' Great Plains Systems Research Unit in Fort Collins, Colorado, analyzed growth patterns of corn root systems. He attributed changes in the distribution and architecture of the roots to chemical activity of the tips, the sites of cell division. These changes may increase or decrease the volume of soil accessible to the roots for taking up water and nutrients.

Growing root tips are uniquely positioned to serve many sensory and signaling functions.

Plant psychologists have been uncovering increasing evidence that plant roots chemically signal shoots about soil conditions like hardness and temperature. Signals include nitrate—a plant nutrient—and hormones, including cytokinins and abscisic acid, which are believed to regulate growth and development of shoots and roots.

The shoots responds in one of two chief ways. Production of enzymes used in photosynthesis slows down or speeds up. Leaf pores enlarge or shrink, also influencing photosynthesis. These responses, in turn, further modify the shoot's nitrogen demand, photosynthesis rate, and water use.

Ultimately, researchers hope the information can help farmers better control pests and diseases, while reducing the effects of environmental stresses such as drought on crops. The strategy would involve interpreting soil and plant data obtained by precision farming technologies such as remote sensing and yield monitors.

This article was published in Good Fruit Grower, May 1, 1998.

THIS SPACE AVAILABLE

Do you have something you would like to trade or sell? Let us hear from you and we will publish your item.

Do you need something? A tool? ladder? a particular scionwood? Let us hear from you and we will put it in the newsletter.

RECIPES TO TEMPT YOU
GEORGE MICHAELSEN'S WINNING APPLE PIE

George W. Michaelson, Sr. of Portland had developed a recipe for apple pie using home-canned apples. At the age of 75, the novice baker won the sweepstakes award for the best pie of any kind at the 1982 Multnomah County Fair. The retired maintenance man had been baking pies for only five years. He died at age 87 in 1994. Michaelson's technique involves the apples releasing their juices and then canning them to be used later in pie making. By allowing the apples to release their juices more can be used in the pie. Then he added the thickened juice to the apples in the pie.

THE FILLING
makes one 9-INCH pie

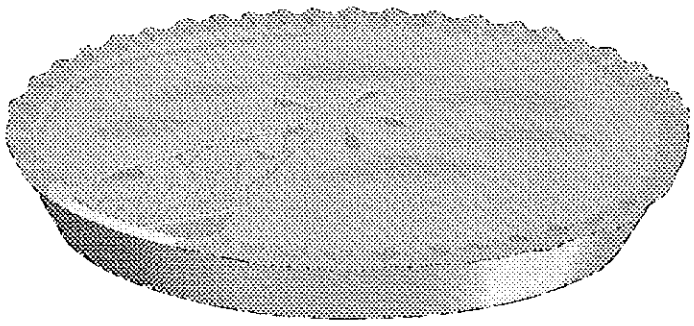
Pastry for 9-inch 2-crust pie
1 quart sliced apples, canned in own juices (see above)
2 tablespoons cornstarch
1 tablespoon fresh lemon juice
ground cinnamon
2 tablespoons butter or margarine (about)

preheat oven to 400° F

Roll out 1 round of prepared pastry and line 1 9-inch pie plate. Drain the apples, reserving the liquid. Place apple slices in pastry crust. Add a little of the reserved apple juice to the cornstarch; blend until smooth. Stir the mixture into the remaining apple juce and lemon juice; pour over the apple slices. Sprinkle with cinnamon; dot with butter or margarine. Roll out pastry for the top crust; cut slits (this allows steam to escape).

Moisten the edges of the bottom crust with water; place the top crust over it and press around the edges. Trim the top crust, tuck the edges under and crimp to seal. Brush the crust with the egg-water mixture left over from making pastry (see pastry recipe). Bake about 45 minutes or until well-browned.

If desired, to keep the outer rim of the crust from becoming over-brown, cover it lightly with a 2-inch strip of aluminum foil.



PASTRY
makes 3 2-crust pies

5 cups all-purpose flour
1 teaspoon baking powder
1 teaspoon salt
3 Tbsp firmly packed brown sugar
1¾ cup lard or shortening
1 egg
1 Tbsp vinegar

In a large bowl, mix together flour, baking powder, brown sugar, salt.

Using a pastry blender, cut in the lard until the mixture forms fairly large, even crumbs.

Beat the egg lightly in a measuring cup. Add the vinegar and enough water to make ¾ cup. Add enough of this mixture to the flour mixture, blending with a fork, to make a soft dough that leaves the side of the bowl and can be formed into a ball.

Reserve the remaining egg mixture for brushing the top of the pie before baking.

Divide the dough into six balls, flatten into rounds, wrap in plastic and refrigerate. If not used immediately, the dough may be frozen.

CANNED APPLES

10 quarts peeled, cored, sliced cooking apples
7 cups granulated sugar
juice of 1 or 2 lemons (1/4 to 1/2 cup)

Place apples in a large crock or bowl; add sugar and lemon juice, stirring gently to blend well. Cover and allow to stand overnight so apples can release their juice.

The next day, wash 8 quart jars; keep hot until needed. Prepare lids as manufacturer directs.

Using a slotted spoon, lift apple slices from the juice and place them in jars, filling the jars 3/4 full. Heat the juice to boiling and pour over the apples to within 1" of the tops of the jars. Release bubbles by slipping a plastic knife between fruit and side of jar. Wipe jar rim clean with a clean, dry cloth or paper towel; attach lid following manufacturer's directions. repeat with remaining jars.

Process in a boiling water canner for 20 minutes (25 minutes at 1,000 to 6,000 feet; 30 minutes over 6,000 feet).

These recipes originally appeared in *The Oregonian* October 14, 1997 in an article by Barbara Durban. Edited for publication in The Bee Line.

ORCHARD CARE CALENDAR
WHAT TO DO and WHEN TO DO IT

July through September:

—Apple Maggot control: clean all traps every two weeks
recoat yellow traps with Tangletrap and ammonium carbonate mix

—Codling Moth control: replace pheromone lures every 3 weeks; monitor to time in secticides
band each fruit tree with burlap, remove larvae weekly

—Windfalls: remove daily, don't provide shelter for maggots or apple worms

—Check staking of young trees: brace limbs as fruit grows

—Maintain soil moisture in root zone of young trees and **all** trees on dwarf rootstock

July:

—net blueberries and figs from starlings

—fertilize June-bearing strawberries after harvest, remove dead leaves and other debris, pin runners for new plants

—plant fall garden-seed directly into soil: radishes, lettuce bush beans, onions carrots, turnips beets

—make a frequent insect inspection of your garden, remove the bad guys by hand

August:

—summer prune trees starting Aug 1

—bud graft from Aug 1

—shield tomatoes (they're fruit) from dew starting Aug 1; a new strain of late blight is devastating

—prune out this year's fruiting raspberry canes right to ground

—harvest summer apples, pears, stone fruit

—monitor maturity of midseason apples and pears; starch iodine test or pressure tester help

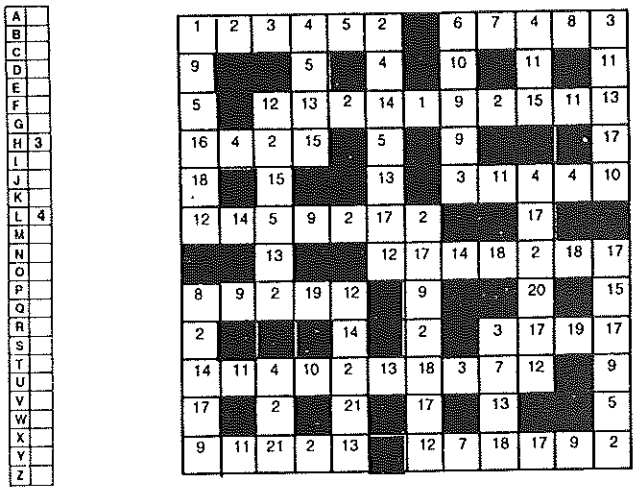
BILL DAVIS RESIGNS

Bill Davis, a long time member of Western Cascade Fruit Society tendered his resignation from the Board of Directors in June, effective immediately.

Bill has been a Board member for over ten years, and a member of WCFS since 1985. He feels that it is time for a change of focus for him and for someone else to take over his duties. Bill has been an active member of the Board, handling the fruit tasting table at the Fall Fruit Show and the scion wood sales at the Spring Sale.

His presence at the meetings will be missed as will his good works. We hope to see him at our events, and wish him well in whatever endeavor he takes up.

Here's a puzzle to sit down and relax with when you come in tired from doing your orchard chores. Each number represents a letter of the alphabet. All you have to do is decide which represents which. Each answer, across or down, is a single word. Most concern things in the garden, but there is very little fruit, though quite a lot of flowers. Answer next issue of the Bee Line



Courtesy Fruit News, the magazine of the Friends of Brogdale. Winter, 1997

BEE KILLS REPORTED 1992 - 1996

The use of residual insecticides in tree fruits is the primary cause of bee kills investigated by the WSDA. From 1992 to 1996, there were 114 bee kill incidents reported to the WSDA. The majority of bee kills were in central Washington (primarily in Yakima Couonty), and approximately one-half of the incidents were caused by the use of residual insecticides on tree fruits. The three insecticides responsible for most of these incidents were **carbaryl, chlorpyrifos, and methyl paratihon (encapsulated).**

There were 8 incidents reported to the WSDA in 1997. The bee kills were all in central Washington (3 in north-central Counties). Some investigations are not yet complete, but the majority of bee kills in 1997 are suspected to be from insecticides used on tree fruit.

Pesticide applicators need to follow label and rule directions. Controlling weed bloom in orchards is an essential part of preventing bee kills. WSDA is working on improving the polliator protection statements on insecticide labels which are toxic to bees (especially tree fruti insecticides).

WSDA will require a pollinator protection statement on the Washington State SLN label for insecticides which are toxic to bees. WSDA revised tree fruit and canola insecticide labels in 1997, and will revise small fruit and seed crop insecticide labels in 1998. When appropriate, WSDA will recommend changes to pollinator protection statements on Federal Insecticide labels.

FRUIT TREE BIOTECHNOLOGY

by W. David Lane

Dr. Lane's specialty is apple and cherry breeding; he is with the Biotechnology Department of the Pacific Agri-Food Research Centre at Summerland, B.C.

Genetic engineering or biotechnology is a new application of scientific knowledge resulting from advances in the understanding of DNA (deoxyribonucleic acid), the genetic template, and how it works to determine the distinctiveness of species and individual organisms. The quantum leap in understanding and the possibilities of using this knowledge has resulted in public debate about its implications and interest and speculation about how the new technology can best be used for advancing human interests.

A key step in the development of genetic engineering was the discovery of restriction enzymes in bacteria. Proteins of this family cleave DNA molecules at a specific, predictable site based on the ordering of three to six adjacent nucleotide bases. This allows fragments of DNA to be isolated and subsequently manipulated. Other contributing techniques were developing the ability to clone the isolated DNA fragments to make a larger quantity available to work with and the continually improving capabilities for analysing the structure of the DNA fragments, synthesising oligonucleotides with the nucleotide bases in a specified order, accumulation of information about known sequences and the corresponding proteins which they specify in data banks which can be easily searched and so on.

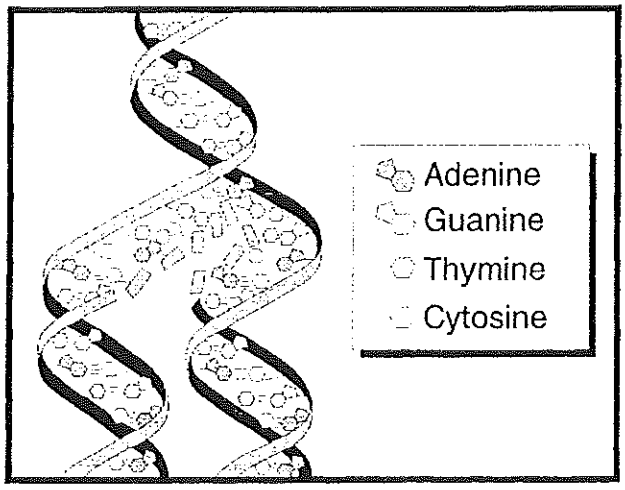
The information about the genetic components can be used to alter traits of an organism but there is often an additional need for detailed knowledge of the physiology and biochemistry of the organism in order that the genetic knowledge can be applied to give predictable results. This is often a limitation because of the complexity of higher (and lower) organisms. In fact molecular biology is helping to solve this problem by making it possible to analyse the difference between a mutant with altered traits and the clone from which it originated.

What Is Possible?

Genetic engineering at the preset time is largely limited to the single protein product of a gene or the intermediates between the gene and the protein. A new protein not normally present can be synthesised by the plant when the gene from which it is derived is added to the plant's DNA, or synthesis of a normally present one can be inhibited. It would be very difficult, for example, to change a plant so that a new plant product was produced which required several steps in its synthesis, each requiring a different protein enzyme catalyst. A common goal of genetic engineering projects is to inhibit the synthesis of one protein normally produced in the organism resulting in an effect which is very similar to a naturally occurring mutation. Induced mutations caused by irradiation or chemical mutagens have a long history of use in plant breeding; the molecular biology approach allows a genetically engineered change which is predictable and directed towards a trait determined by a known protein.

How is the genetic material DNA altered to result in the synthesis of a new protein or the inhibition?

A short review of the steps involved between DNA and the final protein product suggests points where intervention might occur. The DNA molecule is composed of a backbone chain of molecules of deoxyribose, a six carbon sugar, joined to each other by phosphate molecules. Attached to the sugars are the four nucleotide bases either cytosine, guanine, adenine or thymine. The sequence of the bases in the chain is very variable and is analogous to a four letter alphabet. A particular combination of three bases along the chain (a word) specifies one amino acid, the amino acids are subsequently joined into an amino acid chain based on the order of the words (the three nucleotide groupings) on the DNA molecule, i.e., the DNA nucleotide sequence. The resulting chain of amino acids (often about 500 units long) coils in a predictable way due to the electrical charge given the chain by the amino acids. The DNA molecule is two similar chains joined by hydrogen bonding of the other and adenines of one to thymines of the other. The two chains exactly correspond and in this way, when the cell divides as the organism grows, can form a template so the ordering of the bases (hence DNA) in the new cell is exactly the same as in the old one. If it were uncoiled the DNA molecule in each cell would be about two metres long.



There is an important intermediate between the base triplet words of the DNA and the protein product. This intermediate is a second nucleotide chain called RNA (ribonucleic acid) because the sugar forming the backbone is ribose rather than deoxyribose (the base uracil is

also substituted for thymine). RNA is a single chain rather than double like DNA. The double alpha helix chain of DNA separates allowing the RNA to form with the ordering of the nucleotides in the RNA being a copy, using the DNA as a template, thus preserving the three letter coding for amino acids, and the ordering of the specified amino acids in the chain, yet leaving the DNA intact so the process can be repeated. The DNA has signaling sequences which indicate where the RNA synthesis is to begin and end so that only one complete gene is transcribed. The RNA then migrates to a different location in the cell where the amino acids are accumulated and synthesised into the amino acid chain, as determined by the sequence of nucleotides in the RNA, and eventually formed into a protein.

How is the foreign DNA gene incorporated into the plant?

Genetic engineering techniques usually depend on inserting a new gene into the DNA chain. This new gene can specify the amino acids for a foreign protein but another technique is to specify a sequence which results in a RNA sequence matching that of the normally occurring one which specifies the protein of interest. The new matching sequence then binds to it resulting in double stranded RNA (with similar nucleotide pairing to the double stranded DNA). This inactivates the RNA preventing the protein of interest from being synthesised.

Several methods have been used to incorporate the foreign gene but a common one with plants is to enlist the help of the crown gall bacterium. Pathogenesis by this organism is based on its natural ability to incorporate several of its own genes into the plant host. These genes when incorporated into the plants DNA result in the growth of the galls characteristic of the disease. Molecular biologists have modified the plasmid (a secondary DNA chain in bacteria) which carries these virulence genes, removing those which result in the galls and substituting the gene of interest.

The next step is to infect the plant, usually a plant tissue culture, with the engineered bacterium and to regenerate plants from those tissue culture cells which were genetically transformed by it. In addition to the gene of interest a second gene is required which allows a selective agent to be used which when added to the tissue culture medium allows the transformed cells to grow while the wild type cells of the culture are prevented from growing. This second gene can confer, for example, resistance to a herbicide or antibiotic. The herbicide or antibiotic is then added to the medium so the transformed cells, which were made resistant, can grow but the others are inhibited. A third gene is also involved. This one is involved in the regulation of transcription of the gene once it is incorporated into the plants DNA and is called a promoter. These can be the constitutive type, which causes the protein to be continuously synthesised, or can restrict transcription of the foreign gene to particular tissues, a certain stage of plant development, result in synthesis only at certain temperatures or similar actions.

What traits might be altered in fruit trees?

Fruit breeding traits can be classified as those which influence cost of production; factors such as disease and insect resistance, plant response to environmental influences and plant growth or, fruit quality traits which often have a greater impact on returns per hectare. Based on examples in other crops, possibilities for consideration in tree fruits biotechnology might be some of the following: preventing pollen incompatibility reactions, genes which result in the synthesis of proteins which inhibit growth and development of moth larva, nematodes and other pests with Bt, protease inhibitor, or other proteins; inducing resistance to fungus diseases with, for example, enzymes which digest the fungal cell walls; frost tolerance from proteins which retard ice crystal formation; salt or drought tolerance and many other physiological responses limited only by a detailed understanding of a plants physiological responses and the imagination of the investigator.

Major traits determining fruit quality also can potentially be altered. Traits such as fruit firmness and the softening response after harvest could be changed by influencing the structure of the cell wall and the digestion of the cell wall components which occurs when fruit softens during maturation and ripening. Colour might be influenced by changes to the regulation of pigment accumulation or type of pigments so that amount, type and brightness of colour were changed. Shape and size might be altered by influencing cell number, cell size, seed number, fertility and other traits;flavour might be altered by changing the balance or types of sugars and acids, and the esters, aldehydes and other flavour compounds; ripening reaction might be influenced by changing the response of the fruit to ethylene or other regulators of fruit physiology.

Genetically engineered fruit trees are not presently being sold to growers although several tomatoes such as Flavr-Savr are. Genetic engineering projects usually require teams made up of several specialists and many steps from gene construction through to commercial cultivar development must be undertaken. Regulation and interaction of genes is not completely understood and projects can be delayed by genetic constructs which don't work as expected, are unstable in the transformed plant or interact negatively with other traits. Regulatory issues are also not settled and public reaction to genetically engineered crops could be swayed by unpredictable events. Like many new endeavors genetic engineering of fruit trees will no doubt be more complicated and difficult than the initial concepts suggest, but it is an innovative technique with the potential to result in new and different kinds of improved fruit cultivars.

This article was published in The Cider Press, newsletter of British Columbia Fruit Testers Association, Spring 1998 issue.

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NEWSLETTER EDITOR

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If your address label has the renewal date highlighted in **RED**, this is your last newsletter
if it is highlighted in **YELLOW**, your membership dues are delinquent
if it is highlighted in **GREEN** your dues are payable before the next newsletter

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.

SEND IN YOUR E-MAIL ADDRESS AND WE WILL START A FILE OF WCFS MEMBERS

NEXT NEWSLETTER OCTOBER 1998

WE WANT TO HEAR FROM YOU

Your Board of Directors needs guidance, as does your newsletter editor. So we are trying to make it easier for you. As you renew your membership, or if you choose not to renew, would you let us know what you think. You may respond even though your membership is not due for renewal!

Are you interested in articles on vegetable or other gardening? Yes____ No____What? _____

What would you like to read about? _____
Please be specific use a separate sheet if you need to
What changes would you make in The Bee Line? _____

What changes would you like to see at the Fall Fruit Show? _____
Location?
What changes would you suggest for the Spring Sale/Meeting? _____
Location?
What topics for speakers? _____

Is there a particular speaker you would like to have? No ____Yes___Name_____

How else can we help the home orchardist? _____

What area do you have for planting, acreage (how much?) or city lot? _____

Any other comments? _____

_____

WESTERN CASCADE FRUIT SOCIETY MEMBERSHIP INFORMATION

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

(___) New
Name(s) _____ (___)Renewal

Street Address _____

City, State, Zip _____

Phone _____ E-MAIL ADDRESS _____

_____Member at Large	$10.00	_____Seattle Tree Fruit (includes monthly newsletter)	$18.00
_____North Olympic	$10.00		
_____Peninsula-Kitsap	$10.00	_____Tahoma	$10.00
_____Piper Orchard	$10.00		

_____Donation for Western Washington fruit research at Mt. Vernon

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

BOARD MEMBER FALL FRUIT SHOW COMMITTEE CHAIR FIELD TRIPS SPRING MEETING

ARRANGING FOR SPEAKERS NEWSLETTER MAILING 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, 2625 13th Ave W - Unit 306, Seattle, WA 98119-2054

SUMMER 1998
WEB SITES TO LOOK INTO

Western Cascade Fruit Society	http://www.wcfs.org
Home Orchard Society	http://www.wvi.com/~dough/HOS/HOS1.html
North American Fruit Explorers	http://www.nafex.org
Good Fruit Grower	http://www.goodfruit.com
California Rare Fruit Group	http://www.crfg.org/

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