



The Bee Line

NEWSLETTER OF

WESTERN CASCADE FRUIT SOCIETY

A NON-PROFIT EDUCATIONAL ORGANIZATION

Volume 18 Number 3

Summer 1997

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



Well, here we go again. Just when you get used to this publication it changes. New logo, new masthead—two changes in one issue. It may take your editor awhile to get over this. Let me know what you think, send in your suggestions. Send in articles.

Don't like the shape of the pear tree you planted on 1992? See page 15 on how to retrain it.

That peach tree too big for the space you have? See page 16 to find out how the commercial growers get more trees per acre...if it works for them, it will work for the home orchardist!

Want to know what apple varieties grow best in our area? See page 17 for commercial growers choices.

Want to know who plants apple trees in containers, and how he does it? Read all about it on page 20

Did you ever hear of pollen bombs? Read about them on page 14

Wondering about the Fall Fruit Show? Check out page 3

Thinking about using a nitrogen fertilizer? Find out which one is best for you on page 10



DATES TO REMEMBER

LOOK FOR MORE INFORMATION ON THESE EVENTS INSIDE

July 12	WWTFRF Mt. Vernon Harvest Day: cherries
July 31	Pacific Northwest Jonagold Apple Conference
August 9	WWTFRF Mt. Vernon Harvest Day: peaches, nectarines and plums
September 5-21	Western Washington State Fair-Puyallup
September 13	WWTFRF Mt. Vernon Harvest Day: pears, Asian pears, early apples
October 11	WWTFRF Mt. Vernon Open House/Field Day/Harvest Day: pears and late apple
October 18	Peninsula Fruit Club Chapter Fruit Show
October 25-26	WCFS FALL FRUIT SHOW
November 1	North Olympic Fruit Club Chapter Olympic Fruit Festival
Feb 4-8, 1998	Northwest Flower & Garden Show

NEWS FROM THE CHAPTERS

NORTH OLYMPIC FRUIT CLUB

At its April meeting, the NOFC voted to hold a 1997 Fall Fruit Show on November 1, to be called The Olympic Fruit Festival, at the Sequim Prairie Grange Hall (Macleary Hall). The Clallam Coop Association has offered to be the sponsor. There will be no admission charge.

The major attractions will be fruit displays, a large fruit tasting table and educational displays.

In future years they hope to expand the festival to include all types of fruit growing activities such as berry farms, wineries and allied commercial organizations with the goal of becoming a community event each year.

New officers elected at the May meeting are:

President, Eric Simpson
Vice president, Paul Moore
Secretary, Barbara Couvion
Treasurer, Larry Barelo

PENINSULA FRUIT CLUB

Mike Shannon, president of Peninsula Fruit Club, reports the following schedule:

August 9 Budding demo at Lowery's orchard
Sept 27/28 At Valley Nursery in Poulsbo to publicize WCFS
Oct 18 Fruit show at West Side Improvement Club in Bremerton

Call Mike for more information 360/373-9489

PIPER ORCHARD

Ron Schaevitz, president, reports that at the southern part of the orchard fruit set is medium to light, while towards the north fruit set is decent.

Paul Donaldson, treasurer, told me that Piper Orchard Chapter has been doing routine pruning on their scheduled work party days. Due to Park Department budget cutbacks, there has been no mowing so the members cut by hand around the younger trees and use a weed whacker around the older ones. In addition, they have focused on eliminating (or trying to) Japanese knot weed (a bamboo like plant) which is very aggressive. An area of about 1000 square feet has been cleared so far.

SEATTLE TREE FRUIT SOCIETY

In April Dr Ralph Byther lectured on tree fruit diseases in our area. Marlene Falkenbury, president, reports it was one of the best programs ever.

Summer orchard tours began in May to T.K. Panni's Bellevue home, and John Curry's Woodinville residence in June. Future tours will be as follows:

July 26 to Dick Tripp's in Edmonds
Aug 23 to Pete Svinth's orchard on Vashon Island

Marlene reports that Paul Gotz and Lyle McKnight are new members STFS board, joining Dick Tilbury, Charles Armstrong, John Curry, Gerry Daily, Sieg Kiemle and Phil Swanberg.

SOUTH PUGET SOUND CHAPTER

Tim Driver, co-president, announces the following meeting programs:

July, a talk on leaf analysis;
August, a picnic and fruit tasting;
September, pruning and fruit tasting;
October, bees and fruit tasting;
November, fruit tree selection and root stock.

Tim adds that if anyone is interested in speaking at one of their meetings to give him a call.

TAHOMA CHAPTER

Ed Jones, Tahoma chapter president, reports that the June meeting reviewed tool care, proper tool sharpening and a different outlook on pruning. He added that there will be no July meeting. The August meeting will cover food preservation-what to do with all that fruit.

Reporting on the Puyallup Spring Fair held April 18, 19, and 20 Ed says that it was very successful. It was manned by Tahoma members. On display were cherimoyer, English walnuts and dried fruit that was grown by the members. Fresh material was brought in as needed. Some difficulties were encountered — set-up and take-down had to be done after 11:00 p.m. Many compliments were received from the Fair sponsors and there is a chance that WCFS will have a 38' booth (double the size we have had in prior years) for the September Fair. [More about that elsewhere in the newsletter.]

CHAPTER PRESIDENTS: LETS HAVE MORE NEWS FROM YOU FOR THE JANUARY ISSUE

1997 FALL FRUIT SHOW

SATURDAY OCTOBER 25

9:30 a.m. to 5:00 p.m.

AND

SUNDAY OCTOBER 26

10:00 a.m. to 4:00 p.m.

at

Edmonds Community College

200th SW and 68th Ave W

Lynnwood, Washington

LOTS OF FREE PARKING

ADULTS \$3.00

CHILDREN UNDER 16 FREE

SATURDAY PROGRAM

10:30 a.m.	Scott Connor	Ornamental Crab Apples
1:00 p.m.	T.K. Panni	Establishing & Evolving a Home Orchard
2:30 p.m.	Francois Kissel	Gourmet Cooking with Fruit

SUNDAY PROGRAM

10:30 a.m.	Kristan Johnson	Edible Landscaping
1:00 p.m.	George Pinyuh	Controlling Tree Fruit Diseases
2:30 p.m.	Cisco Morris	Ask Cisco- answers to your questions about fruit

CONTINUOUS BOTH DAYS

FRUIT TASTING

APPLE IDENTIFICATION

MASTER GARDENERS

MEMBERS FRUIT EXHIBITS COMMERCIAL EXHIBITS

APPLE MAGGOT DISPLAY

FALL FRUIT SHOW INFORMATION

The apple identification experts will be there to name your mystery apple. You should select fruit that is typical in color, size and shape for the tree you are trying to identify. To assist them, bring four to six specimen with stems and free from 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 and 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?

DISPLAYING YOUR FRUIT

Have you considered submitting your fruit for display at the Fall Fruit Show? 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.

It is not too early to start planning. The following procedure will make the displays look cohesive.

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 specimens, will be provided.

After harvest the fruit will need to be refrigerated to store successfully. If you can, it would be nice to have some fruit for the tasting display.

VOLUNTEER VOLUNTEER VOLUNTEER

Volunteers are needed to help in several places: the education display, membership table, selling tickets at the door, setting up Friday night, taking down Sunday after the show, and at the fruit tasting table. It's a lot of fun and you get free admission.

To volunteer call:

Set-up/take down	Ben Van Deren	425/778-3428
Education display	Dick Tilbury	206/723-9009
Membership table &		
Door tickets	Evelyn Troughton	206/282-6191
Tasting table	Bill Davis	425/771-8978

Remember, many hands make light work.



WCFS AT THE PUYALLUP FAIR September 5 through 21, 1997

Ed Jones and the Tahoma Chapter will need lots of help at the Puyallup Fair this year. The officials were so pleased with their display at the Spring Fair they are recommending that WCFS have twice the space they had last year, and be there for the entire run.

Ed plans three hour shifts for each volunteer so you will have time to see the Fair also. He has been able to arrange for parking passes as well as free entry to the fairgrounds. Such a deal!! And it is very interesting meeting people and sharing your knowledge with them. The Tahoma Chapter does a fantastic display that just beckons visitors in to become interested in our organization.

It would help Ed tremendously if YOU would call him to volunteer so he doesn't have to spend all his time on the phone calling for volunteers. His phone number: (206)770-3711.



JONAGOLD APPLE CONFERENCE TO BE HELD IN MOUNT VERNON

The commercial apple industry of western Washington and Washington State University Cooperative Extension are hosting the Pacific Northwest Jonagold Apple Conference in Mount Vernon on July 31 and August 1. The purpose of the Conference is to create a climate of learning and exchange to enhance the marketability of the Jonagold apple variety.

The first morning will consist of an overview of Jonagold production and marketing in New York, Michigan, eastern Washington and western Washington. Speakers will include Stephen Hoying from Cornell Cooperative Extension in New York; Philip Schwallier, Michigan State University District Horticulture Marketing Agent; Kyle Matheson with Stemilt Growers, Inc. in Wenatchee; and Gary Moulton, tree fruit researcher with WSU. Phil Fossum, Fossum Orchards, will speak on harvest maturity indices and Rob Valicoff, Valicoff Fruit will provide a warehouse perspective. A panel addressing The Challenges of Marketing Jonagolds led by Alan Merritt, representing retail and wholesale brokers and the Washington Apple Commission, will discuss the unique marketing challenges involved with the Jonagold variety.

The afternoon will include an interactive problem-solving discussion led by Tom Thornton and including Rob Valicoff, Ed Kershaw, Jim Baird and Steve Lutz

followed by commercial orchard tours. There will be a barbeque at WSU at 7:00 p.m. (cost \$10.)

Day 2 features intensive discussions by Hoying and Schwallier on nutrition, water management, tree training, foliar management, crop loading, thinning, return bloom, integrated pest management, maturity and marketing. The latter half of the morning will be highly interactive, with two panels and a presentation by Bill Wolk of Okanogan Similkameen Coop on prediction of fruit storage potential. The first panel will focus on cultural practices unique to Jonagold. The second panel will invite participants to engage in interactive dialog with five experts about future directions for the Jonagold apple industry.

The Conference will be held at the Cotton Tree Inn in Mount Vernon. Lunch will be served both days. Rooms are being held until July 17 at the Cotton Tree Inn.

For more information and registration materials, contact Conference Chair Dyvon Havens, WSU Cooperative Extension at 360/428-4270 or Conference Coordinator Judy Littlefield at 360/293-7356. Registration fee, which includes two lunches, is \$40 before July 15 and \$50 July 15 or after.

WHAT'S HOT IN PRACTICAL TREE FRUIT RESEARCH

The new *Journal of Tree Fruit Production*, edited by Wesley R. Autio, highlights the results of practical research about growing tree fruit. The journal disseminates results of current research that are immediately applicable to researchers, educators, consultants, and growers in a useful, legitimate, and scientific format.

Published biannually, the journal focuses on innovative approaches and technologies related to the management and handling of apples, pears, peaches, plums, cherries, and other tree fruit.

International in scope, the journal presents findings on original research, practical topics in the culture

of fruit, and also lengthier review articles, in a professional journal style and format.

Topic coverage includes training growth regulation, pest management, sustainable production, fruit harvesting, handling, storage, and marketing. The journal helps growers stay up-to-date with current research; this in turn helps the industry to incorporate change rapidly and enhance profitability.

Individual subscription price is \$32.40. For information on ordering the journal, contact The Haworth Press, Inc., 10 Alice St., Binghamton, NY 13904-1580; phone 800-342-9678; Fax 800-895-0582; or e-mail getinfo@haworth.com.

Do you know that of the 570 WCFS members there are about 30 (that I am aware of—and there may be more) who have commercial interests. Some are growers, consultants, nurserymen, landscapers. Some have full time jobs while starting their orchards. Some are retired and starting an orchard—or getting their orchard to the money making producing stage.

These members are a valuable resource to us: speaking at chapter meetings and Spring and Fall meetings, demonstrating grafting and pruning, serving on the Board, sharing their experiences and resources (such as submitting articles to publish in The Bee Line).

And so we devote space to their interests so they may be informed.

NUTRIENT SPRAYS AND FRUIT QUALITY

by Guy Whitney

It has been recognized for more than 50 years that calcium sprays applied during the growing season can improve fruit quality. Bitter pit of apples, cork spot of pears, alfalfa greening of d'Anjou pears, and cracking of cherries have been reduced by well timed repeated sprays. In general, calcium additions also improve fruit firmness

Calcium Sprays

Usually, food-grade calcium chloride is used as a dilute spray; however, calcium nitrate, calcium acetate, and several different calcium chelates have been shown to be effective. Repeated sprays are necessary because of the poor movement of calcium in plant tissues. Fruit calcium levels are not closely correlated to soil or leaf calcium levels and so it is not feasible to use soil and leaf analyses to determine the calcium status of fruit. Fruit analysis during the growing season is being used increasingly throughout the world to predict postharvest performance.

Calcium materials should be used with caution. Both calcium chloride and calcium nitrate can cause fruit injury if applied at high rates, in less than 100 gallons per acre, under warm (above 80° to 85°F) or slow drying conditions. Calcium materials often have very limited compatibility with other chemicals. Be sure to read the label to determine whether other materials can be mixed with your calcium spray.

Calcium Movement

Calcium movement in the fruit and other parts of the tree is restricted. Uptake from the soil is limited to the growing root tips and transport into leaves and fruit is confined to xylem water flow.

As a consequence most soil calcium ends up in leaves, and foliar sprays are needed to increase fruit calcium. However, only spray droplets directly contacting the fruit are any good because no calcium is redistributed from leaves to fruit. Uptake of calcium into

fruit is hindered by the waxy skin and is limited to the outermost fruit tissue. Repeated sprays are necessary because of this limited mobility.

Other Nutrient Sprays

Calcium related disorders can be aggravated by high fruit levels of potassium and magnesium. There are several studies showing that potassium and magnesium foliar sprays can increase calcium related disorders in susceptible fruit. In an attempt to improve fruit quality it has become a fairly common practice for growers to apply foliar nutrient cocktails to their trees during the growing season.

Positive results from this practice from well designed field trials is scarce. If these cocktails contain potassium or magnesium they should be applied only where calcium related disorders are not a problem. Work in Canada by Bill Wolk has shown that potassium sprays can improve red color in apples but the gain in fruit color was more than offset by an increase in bitter pit.

K And Mg Move Within Tree

Potassium and magnesium are taken up rapidly and transported throughout the tree. So, unlike calcium, parts of the tree in the spray shadow will still increase in potassium and magnesium following a spray with these materials. For these reasons, a calcium follow-up spray will not negate the deleterious effects of potassium or magnesium in problematic situations.

In short, if calcium related disorders are a problem, spray calcium frequently during the growing season, and be cautious with foliar sprays which contain potassium and magnesium.

Guy Whitney is a member of Area Extension Faculty, Tree Fruit, Washington State University, 400 Washington St., Wenatchee, WA 98801. This article appeared in the May 1997 issue of Fruit Grower.

FRUIT THEFT BY CHINA CAUSES AN UPROAR IN NEW ZEALAND

by Andrew Higgins London Guardian

Hong Kong —Could this be the final straw? Or at least the last branch? Accused of selling missiles to Iran, buying influence in the White House and pilfering high technology around the world, China may have gone too far.

It has been caught red handed trying to smuggle a new variety of apple out of New Zealand. New Zealand's ambassador in Beijing has demanded an explanation from the Chinese Foreign Ministry, but pressure is growing for a more robust protest to nip horticultural espionage in the bud.

"This is a major case of espionage and should be treated accordingly," said Mike Moore, a former prime minister of New Zealand and now a senior opposition Labor Party member of Parliament. He demanded tough measures to protect New Zealand's "secrets."

Fruit is one of New Zealand's biggest industries. Horticultural exports rose to nearly \$1.1 billion last year, according to the Commerce Ministry.

In a joint operation at the Auckland airport by police, customs and the Agriculture Ministry, 15 cuttings from a new strain of apple were found hidden in the hand luggage of Chinese horticulturists returning to China. To the fury of New Zealand farmer groups, the five were allowed to return home without punishment.

"The incident is a very real concern," said Associate Agriculture Minister John Luxton. "Apparent attempts, such as this, to pirate the fruits of our research labors are very concerning."

WWTFRF NEWS

HARVEST DAY SCHEDULE

July 12	Cherries
August 9	Peaches, Plums
September 13	Pears, Apples
October 11	Field Day, Pears and Apples

Harvest wagons will leave the station compound at 11:30 a.m. and harvesting will proceed at the harvesters' own pace, and depending on the fruit available for picking. Harvest tours may well be completed before the scheduled closing at 2 p.m., so members are advised to arrive at the start of the tour to be sure of July participation. Specimen available for sampling on any given date will depend on the harvest ripeness of each individual variety and cannot be determined in advance.

1. All WWTFRF members can participate in harvest days but no un-authorized (personal) vehicles will be allowed in the field.
2. Bags for harvest will be provided at the stations; other containers will not be taken into the field.
3. Each membership entitles the holder (individual or family) to ONE free bag at the harvest day, additional bags may be provided at the staff's discretion, according to amount of crop available for distribution at each harvest.
4. Harvest days in July, August, and September will be managed separately from any public open house or field day, as in past years. The schedule will be:

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

11:30-2:00 p.m. Tour of fruiting orchards. If you wish, bring along a picnic lunch to eat in the field. We will all have a good time!!!

SCHEDULE NOTES: At the July 12 Harvest there will be a meeting at 10:00 a.m. to discuss the demonstration

garden. **ALL ARE ENCOURAGED TO ATTEND.**

VOLUNTEERS NEEDED FOR DEMO GARDEN

As reported in the Spring issue of The Bee Line, WSU has set aside 11 acres in the most convenient, visible part of the Mount Vernon station for volunteer groups to develop a diverse demonstration garden (DG). The Skagit Valley Master Gardeners have spearheaded the development of the Discovery Garden, an impressive 3 acre project within the DG.

WCFS was approached to develop a demonstration fruit garden (DFG), but had to decline as no member would volunteer to head the project. WWTFRF answered the appeal and has committed to bring together the necessary community resources to reach this goal. A substantial donation was received giving the DFG a solid foundation. However, volunteers are needed to build on this foundation. And at the same time volunteers are needed to help with the research work. If you could commit to just one day to being part of a work party, or making phone calls, or providing refreshments for work party days, and there are other areas in which you could help.

To volunteer, call or write: Kim Siebert, 425/334-0387, 5505 87th Ave NE, Everett 98205

NEW OFFICERS

T.K. Panni, WCFS board member (and speaker at the Last Spring meeting and at the 1997 Fall Fruit Show), was elected president for a two year term at the annual March meeting. Other officers are: vice president, Sam Benowitz; corresponding secretary, Larry Mowrer; treasurer, Georgene Lee.

WHAT IS WWTFRF?

A BRIEF BACKGROUND FOR NEW MEMBERS

Western Washington Tree Fruit Research Foundation was incorporated in 1992 as a non-profit organization to finance research in western Washington. At that time, funding for research in western Washington from WSU was drastically reduced by Washing State budget cuts to WSU.

Prior to that, the field days were for WCFS members in appreciation for the contributions made to WSU, which were specifically for research in western Washington.

WWTFRF is composed of home orchardists and commercial growers with the same interests: research on what varieties of fruit grow best west of the Cascades.

WWTFRF has committed to a budget of over \$15,000.00 for research at WSU Mount Vernon for the 1997 calendar year. They are almost entirely dependent on membership dues to fulfill this commitment.

Many WCFS members, when renewing their dues, send an additional \$5.00 or \$10.00 for research at Mount Vernon.

These contributions are sent to WWTFRF in addition to the amount the WCFS board votes to contribute each year. When the contribution is relayed to WWTFRF, the names of the donors are included.

WWTFRF members participate in the harvest days at no cost. Non-members pay a small fee to join in the harvest. Many WCFS members are also WWTFRF members. All of this helps fulfill the commitment to Mount Vernon research.

And as with all organizations, volunteers are needed.

For more information on WWTFRF membership contact: Larry Mowrer, 8323 71st Ave Ct, SW, Tacoma, WA 98499.

Larry is also an active member of the South Puget Sound Chapter of WCFS.

BRIGHT IDEA: MAKE THE MOST OF YOUR BIRD SCARE PRODUCTS

Bob K. Burns of Philadelphia, MS, maximizes the effectiveness of bird scare products by hanging them so that they move freely and securely, even in windy conditions. Using the materials listed below, Burns provides the following step-by-step method to construct a suspension mounting device out of relatively inexpensive materials.

MATERIALS NEEDED

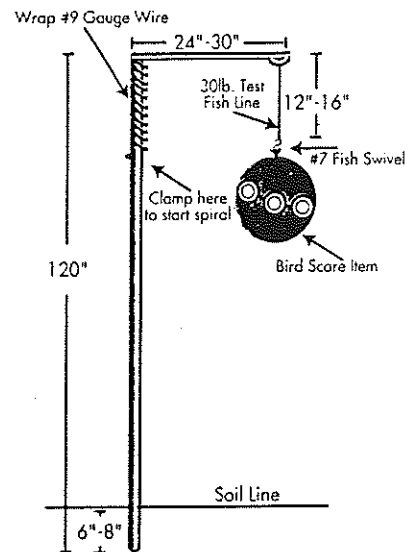
- Ten-foot length of 3/8-inch-diameter steel reinforcement rod (the type used in concrete structures).
 - Six-foot long nine-gauge wire.
 - 18-inch long monofilament fishing line.
 - A #7-size fish swivel.
 - Wire cutter pliers, work gloves & locking-type pliers.
- Note: The 3/8-inch steel rod is sold in 20-foot lengths at most building supply stores, but they will usually cut it in half at no extra charge so you can haul it more easily

"Using the locking pliers, clamp the wire to the end of a 10-foot steel reinforcement rod. While holding the clamped wire-rod, begin wrapping the wire in a spiral fashion around the rod to the end of the rod. Then bend the wire to a 90° angle to the rod.

"Next, cut the wire to the 24-to-30-inch dimension shown on the sketch. Use pliers to bend a closed loop in the end of the wire. Attach monofilament line and a #7-size fishing swivel to the loop of wire as shown in the sketch to accommodate the bird deterrent.

"Advantages of this method of suspension-type mounting include:

- The swivel-line keeps line from becoming twisted but also provides free movement of the scare device in the wind.
- The nine-gauge wire provides flexibility in wind to reduce damage to the scare device and prevents it from becoming wrapped around support rod but also allows good movement in the slightest breeze.
- The support rod provides the ability to relocate the scare device to another part of the orchard, which is essential in optimizing the benefit of the scare device."



Bob K. Burns won \$100 for this "Bright Idea" You are invited to send your previously unpublished innovation to; \$100 Bright Ideas, FRUIT GROWER, 37733 Euclid Ave., Willoughby, OH 44094. Fax: 216/942-0662

WESTERN TREE FRUIT GROWERS JOIN FORCES WITH EUROPEANS

Promising new fruit varieties and rootstocks from Germany, France, and Italy will soon become available to U.S. fruit growers as a result of an agreement signed recently by leading American and European nursery firms. Five nursery groups in France, Italy, and Germany and six nurseries in western states have formed the International Nursery Network (INN) for the purpose of exchanging both varieties and rootstocks developed in the four countries. The group is considering expanding its operation into other countries in the near future, according to an INN news release.

The American contingent recently returned from a meeting with their European counterparts where they examined several promising new varieties being tested. The INN nurseries include C & O Nursery (Columbia and Okanogan), Van Well Nursery, both of Wenatchee; Willow Drive Nursery, Euphrata; Burchell Nursery, Modesto CA; and Pro Tree Nursery, Brentwood, CA; and TRECO, Woodburn, OR. TRECO (Oregon Rootstock and Tree Co., Inc.) is the administrator for the American consortium. Overseas operations that signed the INN agreement are the C.I.V. Group, Italy; GEVO Group in Germany; and

Castang, Davodeau-Ligonniere and Mondial Fruit Selection in France.

INN members will make their varieties/rootstocks available to their overseas counterparts, but, under the agreement, will not be required to share those products with nursery groups or firms in their own countries.

The agreement means that any U.S. varieties or rootstocks which show commercial promise can be released internationally through the consortium and that, conversely, new products can be introduced to the American fruit industry through this channel. "This allows the American grower-discoverer of a new fruit variety to have his discovery introduced into the European fruit community as well as domestically, which offers the best opportunity for promotion and commercialization," a spokesman explained.

The INN concept had been studied for over five years and the idea was finally solidified at meetings in Michigan and British Columbia over the past two years, with the recent signing of the agreement.

April 1997 Pacific Coast Nurseryman & Garden Supply

BITS AND PIECES



SPECIAL PRICE

Orel Vallen has a new shipment of the lemon yellow fluorescent paint used on the apple maggot panels. The price is \$3.25. He will have supplies and information on building the traps at the Fall Fruit Show. Don't miss this exhibit!!

NAME TAGS FOR MEMBERS

Our source of membership badges has been lost to us so the WCFS Board approved the purchase of equipment to make badges. Larry Mowrer of South Puget Sound Chapter offered to make them. The badges will be available, at cost, to chapters and individuals. Badges may be ordered by contacting Larry for details:

Phone (253) 582-9050
8323 - 71st Ave Ct SW
Tacoma, WA 98499-2092

ZIP CODES

As the postal system bears down on bulk mail users, and the rates increase, I feel that it will soon be mandatory to use the nine digit zip code number. If you would include your nine digits as you renew your membership, or correspond with WCFS it would be a tremendous help. Your effort is appreciated.

HELP HELP HELP

Your help is also needed to get the newsletter ready for mailing. In the past, Marilyn and Dick Tilbury and Orel and Alice Vallen have come to my rescue and we have had a pleasant afternoon (sometimes evening) folding, taping and affixing labels. Dick and Marilyn are away on a trip this issue, and Orel is going to try to find some help. If all else fails I can get some of my grandchildren to help—they've done it a couple of times, but I had to bribe them with a movie! If you can help with future issues, give me a call—I'm centrally located on Queen Anne. Evelyn 282-6191

WE HEAR FROM YOU - THANKS

(parenthesis are editors comments)

This is what you tell me you want to read about: fertigation; pruning; fruit for small property; growing apples-spraying, diseases, rootstocks, storage, short season variety tests, apple maggot, production by variety and rootstock, dwarf trellising systems, espaliers; pruning; grafting; less lethal insecticides; disease resistant varieties-(all fruits?); how to (but you didn't say how to do what); plum, pear, apricot, cherry varieties for a specific area; container growing; kiwis, grapes, berries; unusual or little known fruits and varieties; more about fruit show and spring sale (I need specifics-what do you want to read about them?).

This is how you want WCFS to help the home orchardist: easy care fruit for beginners; organic (only) controls, someone to call with tree fruit questions; a classified section-items for sale/trade; book & video recommendations; **issue a clear warning of the danger to bees through the use of insecticides and birds with pelleted fertilizer.**

Speakers you want to hear: Dr. Bruce Barrett; James Ballard; Bob Stebbins; Hazzard from W Virginia. Topics: local successes, apple breeding for new varieties; pollination, osmia, bumblebees; drip irrigation system, watering guidelines for fruit trees; results from a summer apple testing.

Fall Fruit Show changes: more displays; more technical products; better snack bar; more help for beginner; more current varieties at tasting table; kids activities; larger place to accommodate attendees (do you mean in the lecture area?); more people (we like that, bring your friends and relatives!).

Spring meeting: training seminars (need specifics); more things for sale; advertise what's for sale; locate back in north end;

Let me answer some of the comments: The Bee Line is a quarterly publication, the editor sometimes forgets to print information in a timely manner, (and use the spell checker) but will try to do better in the future. Memberships may be renewed for more than one year (WCFS does not remind members of renewal date other than highlighting labels, however, the chapters may do that). I like the idea of a "beginners column", what would you like to read in it? Your editor needs all the help she can get. For you beginners, attend the Fall Fruit Show and the Spring Meeting, visit our booth at the Puyallup Fair or the Northwest Flower and Garden Show-knowledgeable people are there to help. Join a chapter and attend their meetings, you'll be able to meet many experienced home orchardists who are happy to answer your questions or find someone who can.

And -THANK YOU for all the kind and encouraging words.

CHOOSING THE RIGHT NITROGEN FERTILIZER

by Dr Francis J. Peryea

Nitrogen (N) is the plant nutrient that is most limiting to tree fruit production in Washington State. Nitrogen in soils occurs mainly in organic matter, which is naturally low in central Washington soils. Nitrogen fertilizers are applied in orchards to

overcome this inherent soil nitrogen deficiency, and are used over a wider geographical area and in greater quantities than any other type of fertilizer. Failure to supply adequate amounts of nitrogen will retard tree growth, reduce fruit yield, and impair fruit quality.

There are many nitrogen fertilizers that are suitable for use in deciduous tree fruit orchards. The purpose of this article is to describe horticulturally important attributes of commonly used soil-applied nitrogen fertilizers, and to provide some guidelines that a grower might wish to use in choosing among the many types of nitrogen fertilizers that are currently available.

CLASSES OF NITROGEN FERTILIZERS

Nitrogen fertilizers can be divided into two classes that differ principally in how the nitrogen is fixed into plant-usable forms. The first class is synthetic nitrogen fertilizers, which are manufactured by using industrial chemical processes to fix atmospheric nitrogen into the desired plant-available forms. These fertilizers contain nitrogen in the form of simple salts of ammonium (NH_4^+), nitrate (NO_3^-), urea ($\text{CO}(\text{NH})_2$), or some other combination of these three molecules.

Fruit tree roots can absorb all three of these nitrogen forms. Common synthetic nitrogen fertilizers include ammonium sulfate, ammonium nitrate, calcium nitrate, and urea. Synthetic fertilizers are popular because they are relatively inexpensive, convenient to work with, and their effects are reasonably predictable.

The second class is organic nitrogen fertilizers, which contain nitrogen primarily as amines, amides, amino acids, nucleic acids, and proteins, usually in association with complex organic molecules. As organic nitrogen fertilizers decompose, the nitrogen is released as ammonium through a process known as mineralization. The ammonium is then converted to nitrate through a process called nitrification.

Fruit trees do not differentiate between ammonium and nitrate derived from organic fertilizers and ammonium and nitrate derived from inorganic fertilizers. Examples of organic nitrogen fertilizers include manures, blood meal, bat guano, and fish- and other processing wastes. Although some of these fertilizers may have undergone industrial processing, the nitrogen in all of them is derived from the original source material. Use of organic nitrogen fertilizers is required to maintain production certification and may improve soil tilth by increasing soil organic matter.

Urea is technically an organic nitrogen compound because it includes carbon in its structure. It forms naturally when urine decomposes; however, most urea is manufactured by a chemical process and is therefore classified as a synthetic fertilizer.

NITROGEN IN SOIL AND UPTAKE

In hydroponic and small pot experiments where researchers can control the nitrogen chemistry of the tree root zone, the form of nitrogen in the rooting medium has been found to influence fruit tree physiology and growth.

In contrast, with fruit trees grown under field conditions,

the form of nitrogen in the fertilizer does not have a substantial direct effect on tree growth and fruiting performance. Although fruit tree roots preferentially take up nitrate over ammonium, absorbed nitrate must first be converted to ammonium within the roots before the nitrogen in the nitrate is usable by the tree.

The tree produces an enzyme called nitrate reductase to carry out this conversion, and must burn up stored photosynthetic energy to produce this enzyme. Ammonium that is taken up by the roots is already in the required form. The net result is effectively a wash—nitrate is taken up more easily but at a greater energy cost; ammonia is not taken up so readily but requires little expenditure of energy. Tree performance ends up being more or less the same.

Furthermore, the distribution of nitrogen forms in fertilizer will not stay the same after the fertilizer is applied to the soil. In soil, urea is converted to ammonium by a naturally-occurring enzyme called urease. Organic nitrogen fertilizers are decomposed by soil microorganisms and release ammonium. Ammonium, whether it is added in synthetic inorganic fertilizer, produced from urea, or released by organic fertilizer, will be converted to nitrate by soil microorganisms.

Thus, regardless of the initial form of nitrogen in the fertilizer, nitrate usually ends up being the predominant soluble nitrogen form in the soil. All three inorganic nitrogen forms can be consumed by soil microorganisms at any time during the urea-ammonium-nitrate transformation process and converted into soil organic matter. When this new soil organic matter decomposes, the organic nitrogen is released again as ammonium, which can then be converted to nitrate. The newly produced ammonium and nitrate may be taken up by roots or reincorporated by soil microorganisms back into soil organic matter. Nitrate can be very mobile in soil.

If leaching takes place because of excessive irrigation or heavy rainfall, some of the nitrate will be transported below the root zone before soil microorganisms or tree roots can take it up. Nitrogen nutrition will be optimized when irrigation is managed to minimize leaching and to keep applied nitrogen in the tree root zone.

A management rule-of-thumb for orchards is that when you fertilize with nitrogen, you are feeding the soil microorganisms first, the cover crop second, and the fruit trees get whatever is left over.

This cycling of nitrogen in soils occurs constantly during the growing season and is influenced by factors over which growers have no or only partial control, including temperature, soil acidity, amount of organic matter, soil moisture content, and the presence of other mineral elements.

If leaching is not excessive, most fertilizer nitrogen will be ultimately converted to organic nitrogen tied up in soil organic matter. It appears that about the only circumstance in which growers can have good control over the amount and forms of soluble nitrogen in their soil is if they use high frequency fertigation (i.e., daily or several times during the day).

In any one year, fruit trees get part of their nitrogen from nitrogenous compounds stored in their own roots, bark, and wood; part from old soil organic matter, and part from the new fertilizer. With all these post-application changes in nitrogen chemistry it is not surprising that there would be a poor relationship between the form of nitrogen in fertilizer and fruit tree response.

CHOOSING NITROGEN FERTILIZER

If trees are not particularly responsive to the direct effect of nitrogen form in soil-applied fertilizers, then what are suitable criteria for choosing between organic nitrogen-, ammonium-, nitrate, and urea-based fertilizers? There are five questions that you should ask yourself. Your answers will guide you to the product that is best for your situation. I suggest starting with the first question and working your way down the list.

Question 1). Are you restricted from using certain nitrogen fertilizers in order to maintain your Organic Production Certification?

Synthetic nitrogen fertilizers are not allowed under rules of the Washington State Certification Program. See the discussion of Organic Nitrogen Fertilizers that appears later in this article for information about these types of fertilizers.

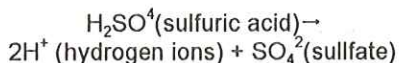
Question 2). Do you specifically need fertilizer nitrogen solutions?

You are obligated to use nitrogen solutions if the nitrogen is to be (a) fertigated, or (b) applied as a liquid through a boom sprayer. Both techniques are designed to deliver liquids. With some formulations, particularly urea or ammonium nitrate, you can make your own nitrogen solutions by dissolving the solid salts in water. Caution is required. Some solid fertilizers contain anti-corrosion agents that may be incompatible with some irrigation water chemistries and form insoluble precipitates. Prilled solids may be coated with clays or other compounds that are insoluble and that will form a sludge when the fertilizer is added to water. These insoluble compounds have the potential to plug drip emitters, microsprinklers, and boom sprayer nozzles.

Before making up your own nitrogen solutions, you should always conduct a "jar test" by mixing the fertilizer with the appropriate water at the desired application rate in a clear glass jar to see if any objectionable precipitates are formed.

Question 3). What is your soil pH?

Soils are characterized according to their acidity. Neutral soils are pH 7, acid soils have pH values less than 7, and alkaline soils have pH values greater than 7. Alkaline soils that contain free lime (also called calcium carbonate or caliche) are termed calcareous and usually have a pH of 7.8 to 8.5. Acidity is caused by free hydrogen ions (H⁺); for example, sulfuric acid is an acid because it releases H⁺ ions according to the equation:



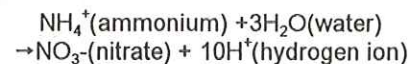
Acidity is expressed as pH which is a measure of the H⁺ ion concentration. The lower the pH, the higher the H⁺ ion concentration and the greater the acidity. The higher the pH, the lower the H⁺ ion concentration and the lower the acidity. Concentrated sulfuric acid has a pH of about 0.3, lemon juice about 2.3, vinegar about 2.8, apple cider about 3.1, tomatoes about 4.2, milk about 6.4, many north central Washington soils about 6.5, the Columbia River at Wenatchee about 7.2, the Yakima River at Parker about 7.9 and a saturated lime solution about 8.2.

Washington orchard soils with pH values less than about 5.5 usually have impaired availability of nitrogen, phosphorus, and boron, and may contain toxic levels of manganese and aluminum. Manganese toxicity is expressed

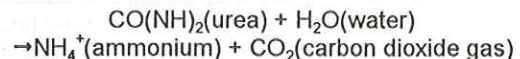
as bark measles, also called internal bark necrosis, which is characterized by smooth, raised pimples in young bark, underlain by small, dark brown spots. The surrounding tissue has a water-soaked appearance. Over time, the pimples develop sunken patches, and the bark begins to crack and scale.

Aluminum toxicity usually starts to become severe at pH values below about 4.5, and causes production of short stubby roots that are poor absorbers of water and soil nutrients. Symptoms include dehydration and induced deficiencies of other nutrients.

Ammonium and urea are acid-forming. Nitrate is not acid-forming. Ammonium-containing fertilizers contribute to soil acidification through the process of nitrification, in which soil bacteria convert ammonium plus water into nitrate plus H⁺ ions.



This means that for each molecule of ammonium added to the soil, ten H⁺ ions are produced to contribute to soil acidity. Urea is also acidifying but first must be broken down into ammonium by the enzyme urease, which occurs naturally in soil. The reaction is:



The ammonium can then be nitrified as shown in the previous equation. The extra enzyme step explains why soil applied urea is slower acting than ammonium or nitrate.

Soil pH can be used as a guide for choosing between nitrogen fertilizers. The native pH of soils in central Washington ranges from about 6.0 to 8.5. Longterm use of ammonium- or urea-containing fertilizers coupled with irrigation has reduced pH to as low as 4.5, particularly on light soils (sandy loam and coarser).

For the purpose of choosing between different nitrogen fertilizers, it is best to measure soil pH in early spring before the first nitrogen application of the season. Soil pH usually declines during the growing season but tends to "rebound" during the winter. Late summer and fall measurements can give low values that overstate potential soil acidity problems.

Although the following guidelines focus on synthetic inorganic fertilizers, many organic fertilizers will also be acidifying because they release ammonium that will form hydrogen ions when it is nitrified. The organic matter in organic fertilizers usually helps to buffer against rapid changes in soil acidity; however, growers who use organic nitrogen fertilizers should still monitor soil pH and lime if necessary.

Acid soils (pH less than 6.0). Use calcium nitrate-based fertilizers because they are not acid-forming and will not further reduce soil pH. Initiate a liming program using a high-quality liming material. When soil pH reaches 6.5, switch to the neutral soil guidelines.

Neutral soils (pH 6.5 to about 7.8). Because the upper end of the pH range for neutral soils is approximate, the acid test for calcareous soils should be made for soils with pH values greater than 7.5 (see the calcareous soil guidelines). Any nitrogen fertilizer is acceptable for neutral soils. If calcium nitrate-based fertilizer is used, no liming will be necessary. If ammonium- or urea-containing fertilizers are used, occasional liming may be required to maintain soil pH.

Although ammonium- or urea-containing fertilizers are cheaper per unit cost of nitrogen than calcium nitrate, you

trade off the cost of the liming product and its application for the higher cost of calcium nitrate. Factor in the cost of the fertilizer, lime, and application to determine which approach is more cost-effective. Do not apply ammonium- or urea-containing fertilizers with lime on top of a freshly limed soil. Ammonium and urea can react with the lime and form ammonia gas, which will be lost from the soil into the atmosphere. Losses can range from 4 to 50% of the applied nitrogen.

Calcareous soils (pH 7.8 to 8.5). The easiest diagnostic test for calcareous soils is to drip a 5% solution of hydrochloric acid (also known as muriatic acid, used for irrigation line and swimming pool maintenance) onto the soil. If the soil fizzes, then free lime is present, and the soil is considered calcareous. Calcareous soils are more likely to be present in the Columbia Basin and Lower Yakima Valley fruit districts but can occur anywhere in Washington. The calcareous orchard soils with which I have worked in Washington usually do not have free lime right at the top of the soil profile; rather, the topsoil is mildly acid to neutral, and free lime occurs in the subsoil. It is important to test the whole root zone to determine if the soil is calcareous.

Any nitrogen fertilizer is acceptable for calcareous soils. The pH of calcareous soils will not drop until all of the free lime is dissolved by acid. Usually calcareous soils contain the equivalent of many tens of tons of lime which will effectively buffer soil pH against change. In most cases, the acidity produced by ammonium- and urea-containing fertilizers is too small to appreciably influence soil pH; however, I have heard reports of long-term use of ammonium sulfate reducing the pH of soils that initially contained only small amounts of free lime. Gaseous loss of ammonia will occur in calcareous soils but will not be appreciable if the free lime is not at the soil surface. Irrigating-in the fertilizer as soon as possible after application will help to minimize loss. There is no distinct advantage to using calcium nitrate-based fertilizers on calcareous soils.

Question 4. Does the nitrogen fertilizer contain other elements that you want to apply?

Some nitrogen fertilizers contain elements that may be beneficial in some orchards. For example, phosphorus starter fertilizer, if properly used, may enhance early growth of newly planted trees. Ammonium phosphates and ammonium polyphosphates contain phosphorus. Keep in mind that addition of any starter fertilizer directly in the rooting zone of a newly planted tree can backfire. During the past decade, excessive rates of monoammonium phosphate added to tree planting holes have damaged or killed thousands of trees in central Washington because of transient soil salinization. There is little evidence that phosphorus applications after the year of planting have a substantial beneficial effect except in certain fruit growing districts such as Hood River, Oregon, where unique soil mineralogy limits the availability of phosphorus.

Calcium nitrate and calcium ammonium nitrate fertilizers contain calcium. Many orchard soils have had calcium and magnesium leached out of the uppermost half-inch or so of their surface layer because of long-term irrigation. Loss of these cations causes soil aggregates to fall apart and form a thin crust that can impede water penetration, even on fairly sandy soils. Addition of calcium to the surface of the soil can

promote reaggregation of the soil particles and enhance water penetration. Use of calcium containing nitrogen fertilizers may provide this beneficial side-effect, as will soil applications of lime (calcium carbonate) and gypsum (calcium sulfate).

In contrast, these calcium-containing fertilizers and soil amendments will not influence the incidences of calcium related fruit disorders such as bitter pit of apple and cork spot of pears. In Washington State, these disorders result from calcium-partitioning problems within the tree and not from lack of calcium in the soil.

Sulfur deficiency occasionally appears in Washington orchards. It has been documented in the Wenatchee River Valley, Stemilt Basin, Manson, and the Yakima Valley fed by the Roza Canal. Occasional use of ammonium sulfate will prevent sulfur deficiency from developing.

Many organic fertilizers contain nutrients in addition to nitrogen. Consult the label for the nutrient content if a label is available. If one is not available, you may wish to have a nutrient analysis done at a commercial testing laboratory.

Question 5. How much money do you want to spend?

Figure out what types of nitrogen fertilizer meet your needs after reviewing the first four questions, then choose the form and the brand that has the lowest cost per unit nitrogen. Expensive specialty fertilizers usually don't have to be applied every year or, if split applications are used, at every fertilizer application. Because they contain internally stored nutrient reserves, fruit trees do not suddenly run out of nutrients. It is quite reasonable to use different nitrogen sources when appropriate to save money.

For example, research suggests that an effective fertigation program may be to use ammonium polyphosphate solution for the first one or two fertigations after an orchard is planted, then switch to less expensive and less acidifying fertilizer solutions like calcium nitrate or calcium-ammonium nitrate.

Another example would be growers who use solid fertilizers substituting a less expensive fertilizer like ammonium nitrate or urea for every other application of a more expensive specialty fertilizer like Triple 16 or calcium nitrate.

SYNTHETIC NITROGEN FERTILIZERS

There are many nitrogen fertilizers that are suitable for use in Washington orchards. The characteristics of some of the more popular synthetic inorganic nitrogen fertilizers are summarized in Table 1 and provide some accessory information following the table. The relative costs indicated in Table 1 are based on 1995 prices.

Nitrogen costs increased substantially between 1994 and 1995, an effect attributed to an explosion that destroyed a major nitrogen fertilizer manufacturing plant in Iowa in December 1994. Your prices in 1996 will depend on the chemical industry's ability to make up for the loss of production and the quantity of product you order from your distributor.

Ammonium nitrate (34-0-0) is potentially explosive if mixed with organic compounds such as oils, diesel fuel, and urea. Calcium nitrate and calcium-ammonium nitrate solutions are not compatible with phosphorus-containing solutions such as ammonium polyphosphate; it will form an insoluble precipitate that can permanently plug fertilizer containers, irrigation pumps, filters, lines, and emitters.

Monoammonium phosphate was formerly sold as 11-55-0 and now is usually marketed as 11-62-0. The 11-52-0

grade has a lower phosphorus content and higher sulphur content resulting from a greater amount of gypsum impurity and is apparently cheaper to manufacture.

Ammonium polyphosphate solution (10-34-0) contains phosphorus as polyphosphate, the most soluble and mobile form of fertilizer phosphorus. It is not compatible with calcium-containing solutions such as calcium nitrate and calcium ammonium nitrate; it will form an insoluble precipitate that can permanently plug fertilizer containers, irrigation pumps, filters, lines, and emitters.

Triple 16 (16-16-16) and other similar complete N-P-K solid fertilizers are made by blending various salts to provide nitrogen, phosphorus, and potassium at particular ratios. Use of soil applied phosphorus and potassium fertilizers is not necessary in most bearing orchards in central Washington.

Phosphorus deficiency has been documented only on volcanic soils in the Hood River area of Oregon; usually a phosphorus fertilizer such as triple superphosphate is preferred to a low phosphorus analysis product like Triple 16.

Potassium deficiency appears occasionally in central Washington orchards, particularly on heavily irrigated sandy soils, and is common in western Washington. Triple 16 and similar fertilizers can be beneficial in these settings.

In most other orchards, research to date indicates that use of complete N-P-K fertilizers instead of nitrogen-only fertilizers will not provide any added benefit to tree growth or fruiting performance. Their use does serve to ease the concern of some growers about depletion of soil phosphorus and potassium because of orcharding activities. In this latter context, use of complete N-P-K fertilizers has an intrinsic value greater than that of its nitrogen content only. Fruit trees in Washington naturally contain sufficient amounts of chloride, so the presence of this element in complete N-P-K fertilizer provides no added benefit.

ORGANIC NITROGEN FERTILIZERS

Organic nitrogen fertilizers have been used for centuries and, with the exception of mined potassium and sodium nitrate salts, were the principal nitrogen sources prior to World War II. They include manures, blood meal, bat guano, fish meal, and other processing wastes. The nitrogen content of these materials varies considerably. As organic nitrogen fertilizers decompose, the nitrogen is released as ammonium, which then undergoes all of the transformations described earlier, including conversion to nitrate, uptake by plant roots, leaching, and reincorporation into soil organic matter.

One guideline that is useful in choosing among organic nitrogen fertilizers is their carbon-to-nitrogen (C:N) ratio. If the carbon-to-nitrogen ratio is too high (i.e., not enough N), then soil microorganisms will use existing soil nitrogen to decompose the added organic fertilizer and can possibly create a nitrogen deficiency in the crop plant. The rule of thumb is that materials with carbon-to-nitrogen ratios of greater than 30:1 will tie up soil nitrogen. Materials with carbon-to-nitrogen ratios of less than 20:1 will release nitrogen. There will be no net change in available soil nitrogen from materials with carbon-to-nitrogen ratios between 20:1 and 30:1.

Stable soil organic matter has a carbon-to-nitrogen ratio of about 10:1. By definition, organic nitrogen fertilizers should have low carbon-to-nitrogen ratios; however, it is wise to confirm the ratio for an organic fertilizer before applying it. If meeting organic certification standards is not a concern, inorganic nitrogen fertilizers can be added to an organic material of high carbon-to-nitrogen to lower the ratio

to an acceptable level.

There are several other considerations associated with use of organic nitrogen sources, many of which likely prompted the swift adoption by growers of inorganic nitrogen fertilizers following the Second World War. Transportation costs of bulky, low-nitrogen analysis organic fertilizers can be high, and handling and application of these products can be inconvenient. Bulky organic fertilizers should be well-mixed before they are applied to help ensure a high uniformity of application of nutrients. Objectionable odors also may result from use of some organic nitrogen fertilizers.

Salt injury and sometimes ammonia toxicity have been frequently observed with fresh manures, composts, sludges, and other poorly characterized biosolids. It is important to make sure that the products have been aged long enough for excessive salts to have leached out and for toxic levels of ammonia to have degassed into the atmosphere.

Any organic fertilizer with an electrical conductivity (EC) greater than about 2.0 mmho/cm (dS/m) carries a risk of causing salt injury. This risk goes up as the fertilizer salt content and application rate increase and as the amount of leaching decreases. It can be minimized by using low-salt fertilizer, by applying split applications of higher-salt fertilizer to prevent excessive salt loading at any one time, and by applying enough irrigation water to ensure that excessive salts are leached below the root zone.

Perhaps of greatest concern for tree fruit growers is the inability to control the rate of nitrogen release from many organic nitrogen fertilizers. Springtime nitrogen availability does not appear to be of particular concern because fruit trees initially utilize nitrogen stored within their own tissues. Problems may occur later in the season, when continued release of fertilizer nitrogen results in excessive shoot growth and poor fruit color.

This release problem can be minimized by using a product which has a well characterized composition and which readily decomposes in soils. Blood meal and refined chicken manure have been used successfully in central Washington orchards. The behavior of raw manures and other wastes of variable composition is less predictable and will require on-farm experience.

Organic nitrogen fertilizers can provide a secondary effect that is very beneficial. They contribute extra organic matter to the soil, which can improve nutrient- and water-holding capacities and soil aeration, and reduce soil density. This effect is enhanced if the organic fertilizer is incorporated into the soil by tillage, although tillage creates a potential problem because of repeated wounding of tree roots and consequent increased risk of infection by soil-borne diseases.

In addition, tillage in high density orchards can damage a substantial proportion of the roots of shallow-rooted trees with small root volumes and thereby induce undesired stunting. There may be rapid regrowth of roots into the tilled and fertile area with consequent improvements in tree performance, so the net effect of tilling-in organic fertilizer is somewhat unpredictable.

CONCLUSIONS

The criteria for choosing a nitrogen fertilizer that is right for your orchard conditions are based on regulatory, logistical, technical, economic, and personal considerations. These guidelines should help you in making your decision. Conduct your own trials in a small portion of your orchard. You may discover some novel and more profitable management directions.

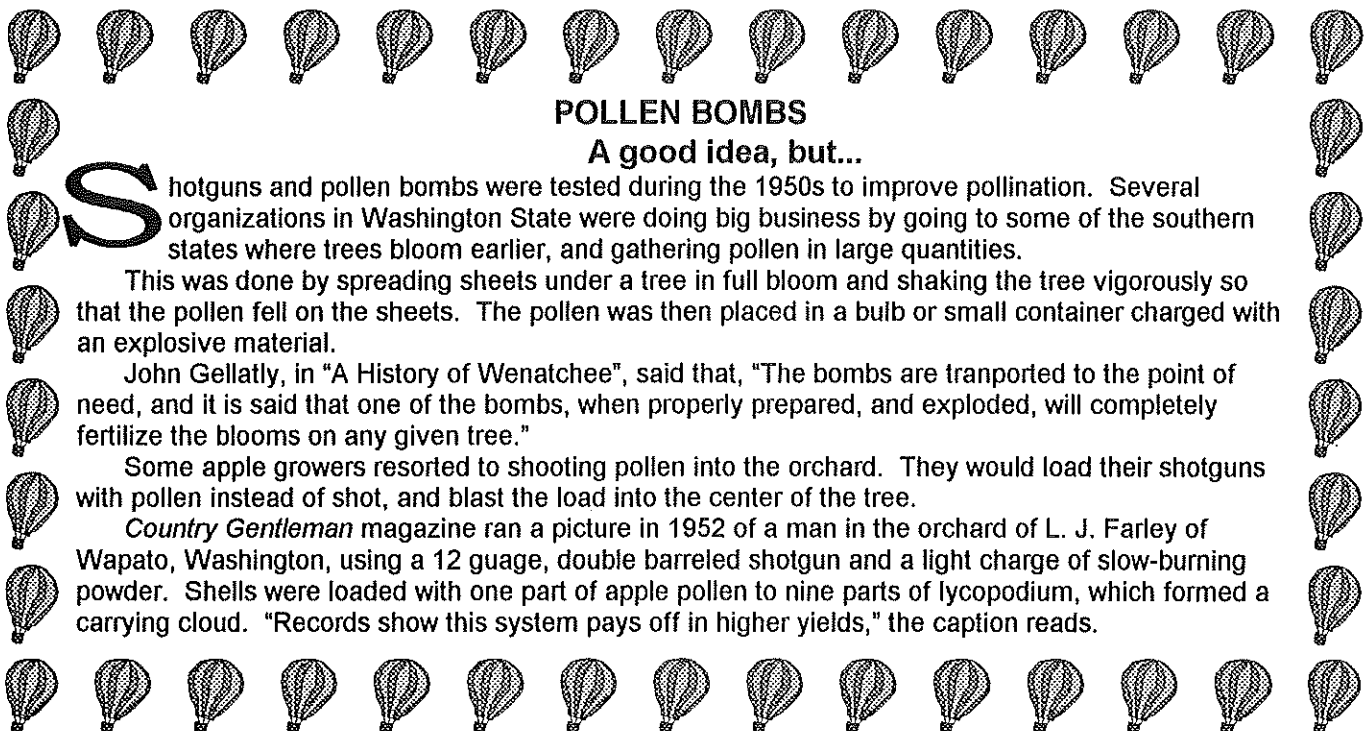
TABLE 1

Characteristics of synthetic inorganic fertilizers commonly used in Washington State tree fruit orchards

Fertilizer (grade)	Acidity potential	Distribution of N forms (%)			Other elements present*	Relative cost per pound nitrogen
		ammonium	nitrate	urea		
Solid fertilizers						
Calcium nitrate (15 5-0-0)	low	7	93	0	Ca	moderately high
Ammonium nitrate (34-0-0)	moderate	50	50	0	none	moderate
Urea (46-0-0)	moderate	0	0	100	none	low
Monoammonium phosphate (11-52-0)	moderate	100	0	0	P	very high
Triple 16 (16-16-16)	moderate	75‡	25‡	0	P, K, Cl	high
Ammonium sulfate (21-0-0)	high	100	0	0	S	moderate
Liquid fertilizers						
Calcium nitrate (9-0-0)	low	7	93	0	Ca	moderately high
Calcium-ammonium nitrate (17-0-0)	moderately low	32	68	0	Ca	moderately high
Ammonium nitrate (20-0-0)	moderate	50	50	0	none	moderate
Urea-ammonium nitrate (32-0-0)	moderate	24	25	50	none	low
Ammonium polyphosphate (10-34-0)	high	100	0	0	P	very high

+Ca = calcium; P = phosphorus; K, = potassium; S = sulfur; Cl = chloride
 ‡ Varies between different complete N-P-K fertilizers; consult the label

Dr. Peryea is Associate Soil Scientist/Associate Horticulturist at Washington State University Tree Fruit Research and Extension Center, Wenatchee. This article appeared in Good Fruit Grower March 15, 1996.



POLLEN BOMBS

A good idea, but...

Shotguns and pollen bombs were tested during the 1950s to improve pollination. Several organizations in Washington State were doing big business by going to some of the southern states where trees bloom earlier, and gathering pollen in large quantities.

This was done by spreading sheets under a tree in full bloom and shaking the tree vigorously so that the pollen fell on the sheets. The pollen was then placed in a bulb or small container charged with an explosive material.

John Gellatly, in "A History of Wenatchee", said that, "The bombs are transported to the point of need, and it is said that one of the bombs, when properly prepared, and exploded, will completely fertilize the blooms on any given tree."

Some apple growers resorted to shooting pollen into the orchard. They would load their shotguns with pollen instead of shot, and blast the load into the center of the tree.

Country Gentleman magazine ran a picture in 1952 of a man in the orchard of L. J. Farley of Wapato, Washington, using a 12 gauge, double barreled shotgun and a light charge of slow-burning powder. Shells were loaded with one part of apple pollen to nine parts of lycopodium, which formed a carrying cloud. "Records show this system pays off in higher yields," the caption reads.

GROWING A WELL BALANCED PEAR TREE

Geoff Thornton, a pear grower in Tonasket, fights a battle at the bottom of a central leader tree and a battle at the top. Top limbs want to grow; most bottom limbs don't. But those that do really take off.

Thornton uses two tree training techniques to win the battle at the bottom of his seven-year-old trees. His first technique: Make back cuts in upright runaway wood of the strongest scaffold limb. (Scaffold limbs are permanent limbs.) The back cuts slow down growth of the limb, give the tree balance, and keep the central leader tree in proportion.

The second technique: One to two weeks after bloom, remove all but one terminal shoot on the breaks that grow from cutting into the one-year scaffolds during dormant pruning. This reduces competition, and the remaining shoot takes off and fills the growing space more quickly.

Meanwhile, to win the battle at the top, Thornton ties down all limbs on his Bosc pears, all the way to the top. This slows growth at the top and allows fruit to fill the entire tree, not just the shell of the tree. Additionally, harvesting can be done with 10' ladders.

These three techniques help Thornton grow near-perfect pears in northern Washington's heavy soils. He has 21 acres of Red D'Anjou and Boscs, on Old Home/Farmington #97 rootstock, spacing of 12' x 18'.

Getting Too Upright

Thornton's goal is to grow a well balanced central leader tree, a difficult task. Every tree yields four or five principal limbs, or scaffolds. Usually, there's one small scaffold, three medium ones, and a strong one that grows upright. For example, the strongest limb might be 1" in diameter, while the other three limbs might be ¾" in diameter. Growth of the precocious limb, which is growing too upright and too big for the rest of the tree, needs to be slowed.

Thornton could cut off the strong scaffold limb, but he'd lose the fruit. The strongest limb usually yields fruiting buds first, so he prefers not to cut this one off.

Instead, he opts for back cuts in the strongest scaffold. Using a pruning saw, Thornton cuts the underneath side of the limb half-way through. He makes three to six cuts 1/8" to 1/4" apart. The limb is then tied to a more horizontal position or a 45° angle to slow growth.

By cutting half-way through the limb on the back side, the cuts close as the limb is tied down. The back cut acts like an accordion, according to Thornton. The cambium layer squeezes together, allowing the wounds to heal quickly.

Saving this limb enables Thornton to get early fruiting by bringing the tree into balance. This technique can be done during dormancy.

Ideally, these limbs would be dealt with earlier in the tree's life. With a baby tree, troublesome limbs could be removed earlier. But when Thornton planted the orchard in 1988, his growing savvy was lacking, he admits. Fortunately, the back cut method allows him to control the tree's balance at year four or five.

Keeping One Shoot

Thornton's second tree-training technique is done after bloom, but it really begins with dormant pruning. During pruning, Thornton cuts into his scaffold. He takes off a third of each scaffold, cutting it down to pencil size. After the cutting, the tree grows three to four breaks—small shoots with leaves.

After bloom, when present season's growth has reached 2 to 3 inches, Thornton removes weaker shoots, leaving one

to grow without competition. It fills the space faster between rows. With trees planted 12' apart, the goal is for one tree to grow east 6', and the adjacent tree to grow 6' out to the west. Thornton wants them to touch.

With a baby tree, you want to fill space first. You can fill in the limb with fruiting spurs and shoots later.

Flat Tied Limbs Reign On Top

On Bosc trees, Thornton ties down all limbs above the scaffold to a more horizontal angle. This method yields fruit all through the tree, and keeps it from growing too tall.

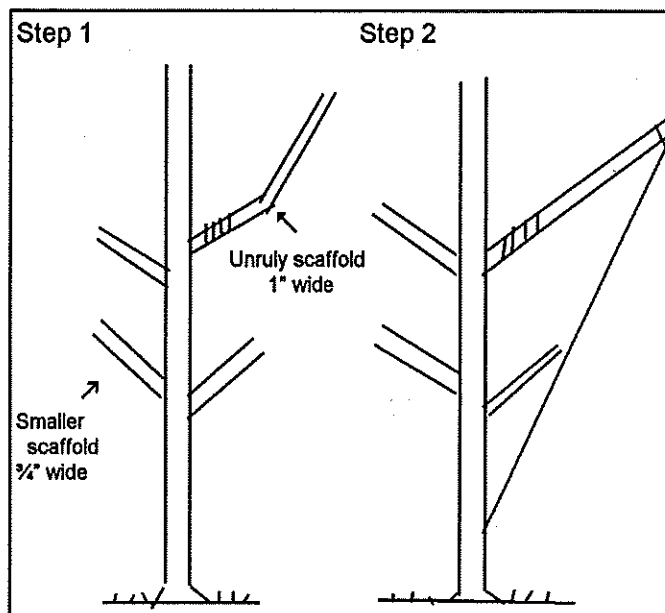
After the third year, Thornton spreads scaffolds at a 45° angle, which helps the lower part of the tree grow. At the upper part of the tree, Thornton keeps limbs in check by tying them down to a 45° angle.

Meanwhile, up top is all vigor. Thornton says his constant challenge is to keep the bottom limbs strong and the top limbs weak.

Upper limbs are tied flat starting in the fourth leaf. Every year, he cuts into one-year wood at pruning time in winter. Limbs that grow from that cut are tied down in an ongoing process. Few are removed.

This gives Thornton more branches and growing points at the top of the tree. More growing points disperse the energy at the top of the tree and slow growth. If Thornton had only three or four branches at the top of the central leader, all energy would go into those few growing points and would increase vigor.

The tying also creates less shade and allows sunlight to penetrate the tree's interior. This yields fruit all through the tree.



Step 1: Make 3 to 6 back cuts 1/8" to 1/4" apart halfway through the limb on the underside of the largest scaffold. As the limb is tied down, the cuts act like a closing accordion. The wound heals quickly.

Step 2: Tie the cut to scaffold to 40° to 45° angle. The flatter slows down growth on the precocious limb.

This article by Dan Stephens was published in Fruit Grower October, 1995.

KAC-V PEACHY FOR STONE FRUIT

High-density orchard system cuts labor, increases profits

Rick Melnick writes in *Fruit Grower*, October 1995 edition, that high density planting has been the answer to many an apple grower's land and labor cost woes, but until now, the stone fruit grower has had no options.

The apple industry has adapted to using dwarfing rootstocks to control the growth of trees, but the stone fruit industry has not been able to follow their lead. A lack of adequate rootstocks in the stone fruit family has forced high-density peach and nectarine farmers to rely on vigorous pruning to curtail growth. The added labor for cultural practices has all but cancelled out additional yield revenues.

A study at University of California-Davis, conducted by pomology researchers Ted DeJong and Kevin Day could provide a break-through for high-density stone fruit growers. The Kearney Agricultural Center Perpendicular "V" training system (KAC-V) is showing promising results in experimental high-density peach and nectarine orchards.

The KAC-V is a cross between the traditional open vase system and the "Y" trellis system. The tree is pruned in the first year to develop two major scaffolds in the shape of a "V". While allowing for a much higher-density like the "Y" trellis, it maintains canopy lighting without the need for the trellis system. The system can be used for peaches or nectarines. Other fruits such as plums, apples, or pears can be adapted to the system as well.

Many high-density systems for stone fruit produce well for a few years, but characteristically become difficult to manage as trees mature. The KAC-V system seeks to produce much higher yields the first few years of harvesting as well as increase manageability later on.

The KAC-V research plot was established in January, 1990 comparing them with three other orchard training systems including the open vase. Data taken from the fifth leaf harvest indicates that the operational expenses per acre for KAC-V were \$21 less than open-vase, while yield was more than three tons per acre higher. Yields in the other training systems were comparable, but costs were also significantly greater.

Commercial growers are advised to leave 5 to 6.5 feet between trees and 15 to 18 feet between rows, depending on soil fertility and cultivar growth. Distance between tree canopies should eventually fall between 12 and 18 inches. In California, tree height is maintained at 10 to 15 feet. Excessive pruning to control height in early stages will only increase vegetative growth and reduce yield. North-south row orientation is advised if possible, as east-west plantings can be more susceptible to sunburn on the south scaffold.

Since the KAC-V system is meant to encourage early maturity and increased early yield, diligent care is very important in the first few seasons.

As with the open-vase system, KAC-V requires young trees be headed 20 to 28 inches from the soil, and the trunks should be painted or wrapped to avoid sunburn damage. Choices for the two primary scaffolds should be made when shoot growth reaches 12 to 24 inches. If wind is a problem, selection may be delayed until the shoots grow a bit stronger.

Crotch angle is crucial in making a choice. They should be 25° to 40° from vertical. Early selection (late April to early June) not only enhances the probability of making the best choice, but will also reduce stress on the

tree. Pruning will also be faster if shoots are easier to see.

This system should need little or no pruning in the first season, as summer pruning will inhibit tree growth by diminishing leaf area. Excessive vigor in the first year may demand a summer pruning in June or July, but only to ensure proper tree formation by eliminating competing branches.

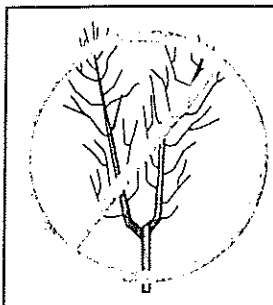
It is imperative that any strong branches other than the scaffolds be removed. However, weaker branches *below* the scaffold will provide leaf area, so could remain. If scaffold direction should stray, heading may be done, but only if absolutely necessary.

For dormant pruning, 7 to 10 fruiting shoots may be left in the first year, with 2 or 3 fruit per shoot. Crop load is proportional to tree growth in the early seasons, so too much fruit can inhibit growth in young trees. Individual pruning and trimming patterns depend on the cultivar.

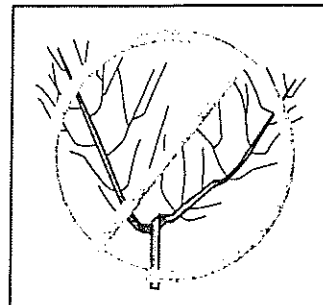
About 36 fruit per tree could be expected from the first harvest, and at maturity 200 fruit per scaffold on 25 to 30 shoots.

Successive summer prunings, in early to mid-May should be simple as well. Training and pruning on established scaffolds are needed to maintain the light environment only. Watersprouts within the "V" structure will become numerous as the tree matures, but only a few should be left to fruit as they will provide protection against sunburn yet allow ample light into the lower portion of the canopy. Delaying the initial summer pruning will result in added difficulty as the season wears on. In some rare cases, another pruning two or three weeks prior to harvest may be needed for light management.

ANGLE TOO NARROW

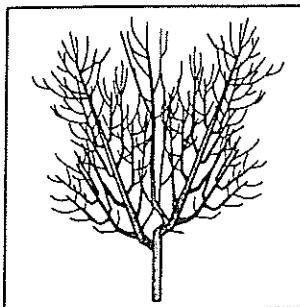


ANGLE TOO WIDE

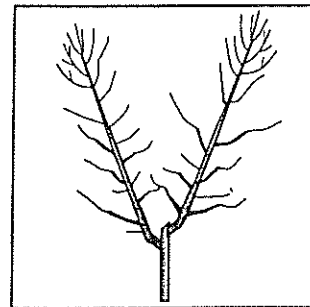


Selection of branches with proper angles (25° to 40° from vertical) is crucial. Selection of scaffolds like those above should be avoided.

BEFORE PRUNING



AFTER PRUNING



Pruning in the first dormant season reinforces direction and proper growth of the two scaffolds selected earlier.

JONAGOLD—AN APPLE SUITED TO WESTERN WASHINGTON CLIMATE

Profile of Jonagold

Although considered a "new" apple variety in Washington, Jonagold was selected at the New York Agricultural Research Station at Geneva, New York, more than 50 years ago and introduced in 1968.

It is a cross of Jonathan and Golden Delicious, and is a yellow apple with a red blush. Several red strains have been introduced that are more highly colored than the standard Jonagold. They include DeCoster, Jomured, Jonica, King, Jonagored, and Nicobel.

The fruit has a shape similar to Golden Delicious and can be held in controlled atmosphere storage for 10 months. The tree is very vigorous, susceptible to scab and mildew, and prone to bitter pit and sunburn.

Apple acreage in northwestern Washington is expanding rapidly, now that growers have found a popular apple that thrives in its relatively cool, wet conditions.

Apples were grown west of the Cascade Mountains more than a century ago, but the apple industry shifted to eastern Washington after the development of irrigation and transportation.

Apple variety enthusiast Dr. Robert Norton, who was superintendent of WSU's Mount Vernon Unit and taught a fruit-growing course at Skagit Valley College in the 1970's helped revive interest in growing apples west of the Cascades. Some of his students, including Tom Perkins of Sedro Wooley and Alan Merritt of Mount Vernon, went on to become successful commercial apple growers and have in turn inspired others.

Gary Moulton, research assistant with WSU in Mount Vernon, estimates that apple acreage in Skagit and Whatcom counties has doubled over the past three years. There are now about 25 commercial orchardists with perhaps a total of 400 acres.

Although their combined acreage is still relatively small, their collective enthusiasm is great, and the area is establishing a reputation as one of the better areas in the world to grow Jonagold.

Alan Merritt planted his first Jonagold in 1982, on what was formerly a dairy and vegetable farm, after seeing the variety in Norton's variety plots and is still planting Jonagold today.

Merritt also grows Gravenstein, which he sells at the orchard and through upscale grocery stores in Seattle. But an apple that does not store and is as fragile as a peach has limited potential. Merritt can sell all of his 300 bins of Gravensteins, but thinks that's enough if he doesn't want to end up eating a whole lot himself. "We don't want any more," he said. "I would rather have a shortage."

A whole list of other varieties, such as Alkamene, Fiesta, Melrose, Spartan, and McIntosh, also grow well in western Washington conditions but have proven hard to sell. Merritt's favorite apple is Hawaii, a chance seedling found in California that probably has some Winter Banana and Gravenstein heritage. It is a flavorful and crisp apple the color of a Golden Delicious, with a pink blush, and the shape of a Red Delicious. He says it's a terrific apple, but doubts it has a commercial future because it looks too much

like a Golden Delicious.

"We could grow Goldens, I suppose," he added.

"But we don't even want to pretend to do what does well in eastern Washington. You can't compete.

There are a lot of varieties that can be grown, but you have to look at the bottom line and figure out what you can do best. We just need to do a good job with Jonagold because Jonagold seems to favor us."

Tom Thornton, an orchardist and nursery owner at Lyndon planned to have Jonagold on about half his 13-acre orchard when he began planting it in 1980. Now his Jonagold acreage has expanded to 75% of the total, and he is taking other varieties out.

Jonagold is grower-friendly, though it is not always easy to get good color, he said. As Jonagold production in the area has increased over the last 15 years, growers have learned how to deal with its peculiarities. "I feel pretty upbeat that the apple's going to be around for awhile," he said. "The learning curve is starting to drop below the angle of repose. I think we've made some big leaps in the last five years."

Jonagold tends to produce overly large fruit, but the positive side is that yields are consistently higher than from other varieties. He can get yields of 60 bins per acre year after year.

Thornton said he's always looking for new varieties, and has a test row of about 30 different varieties. "But I don't see anything out there," he said. "It's got to be a decent size, and look pretty, and be grower friendly, and produce heavy tonnage. I just don't see them." It's also got to be popular with consumers.

Thornton holds an open house each October that is attended by about 2,000 visitors. Of the many apple varieties they are able to sample, Jonagold always wins hands down.

There are some Gala being planted in the area, and growers pride themselves on producing Gala that are exceptionally crisp and red. "But why plant something that just about every region in the world can grow?" Thornton asked, pointing out that there are far fewer places in the world that can grow a good Jonagold.

Tom Sewell, who grows Jonagolds at Lynden, also has experience of growing apples on both sides of the Cascades. He grew up on an orchard in Yakima, and was an orchardist in Zillah and Omak before going into semi-retirement in Lynden in 1990. He did a lot of research and discovered that some growers in

northwestern Washington were having success with Jonagold.

Although conditions are ideal for Jonagold, he says it is still a relatively difficult apple to grow. "It's a learning curve that you have to go through after growing Red Delicious, which is easy to grow," he said. "And I think they're finding that out with Fujis and other new varieties in eastern Washington."

Though western Washington growers may have the edge in terms of growing Jonagold, what they lack is infrastructure. Some of the fruit is packed and sold on farm; some is sold directly to retailers in Seattle, an hour's drive to the south; and an increasing amount is trucked to warehouses in eastern Washington to be packed and sold.

The above article by Geraldine Warner appeared in Good Fruit Grower, October 1995 issue.

PROJECT TESTS THE EFFECTS OF FERTIGATION ON JONAGOLD QUALITY

A research project in the Mount Vernon area is designed to test the effect of fertigation on fruit quality in Jonagolds. Some late-picked Jonagolds do not mature properly.

Gary Moulton, who is heading the project, said in some cases the last fruit to be picked is a dull green color and has insipid flavor. The problem seems to be linked to magnesium and potassium deficiencies, which may be corrected by fertigation.

Moulton said Jonagold seems to be a high user of both potassium and magnesium, and demand for these elements is particularly high during the dry periods of the summer. An acre of Jonagold trees needs 120 pounds of potassium oxide to produce a 40-bin crop of fruit.

Through the project, which is funded by northwestern Washington apple growers, Moulton hopes to determine the effect of nutrition on fruit quality. The tests are being conducted in a planting of four Jonagold strains (standard Jonagold, DeCoster, King, and Jonagored) at the Mount Vernon station. Further tests are being done in the Mount Vernon orchard of Alan Merritt to calculate the turnaround time for improving quality in an orchard with maturity problems.

In the Merritt orchard, magnesium was applied from May through harvest at the rate of two pounds of actual magnesium per acre per week. Potassium was applied at a rate of six to seven pounds of potassium oxide per acre per week from July to harvest. One section of the test block received just water, one just potassium, and the other both magnesium and potassium. Various aspects of fruit quality were to be compared after harvest.

Editor's note: I had hoped to have the results of the tests for this issue, but haven't been able to make contact in time. I'll include them in the next issue.

PREDACIOUS GROUND BEETLES

Predacious ground beetles, also known as carabids, are fast moving insects that generally have long legs and threadlike antennae. They are most often found in wetter regions.

Development from egg to adult generally takes about a year. Some adults may live for two to three years. The larvae are long and wormlike. Most live in burrows in the soil or leaf litter. Both larvae and adult ground beetles have powerful mandibles, which equip them for their predacious lifestyle.

Most ground beetles feed on a varied diet of insects and insectlike creatures, including pests such as cutworms. They hide under rocks or in soil crevices during the day, and feed at night.

There are several thousand species of carabid beetles in North America. Species commonly found in Washington State include the European ground beetle, the green pubescent ground beetle, the common black ground beetle, and the boat-backed ground beetle. They vary in shape and color and can measure from one-eighth to one inch long.

Ground beetles are often the victims of broad spectrum insecticides, but are not harmed by Bt (*Bacillus thuringiensis*) products.

For more information on predacious ground beetles, see Washington State University (WSU) Extension Bulletin 1447 written by Dr. Arthur Antonelli of WSU's Western Washington Research and Extension Center in Puyallup.

NEW CHERRY VARIETIES

Tulare—developed by Bradford Farms, LeGrand, California, was introduced in 1988. It is an open-pollinated seedling of Bing. The fruit is sweet and the skin red. In California, it ripens in May, five days ahead of Bing.

Brooks—developed by the University of California, Davis was also introduced in 1988. It is a cross of Rainier and Early Burlat. The fruit is large and sweet. The skin is dark burgundy red when fully mature, occasionally with some streaking and mottling, but it is often harvested while still a blush color. It is susceptible to rain cracking. Flavor is sweet, rich, but not aromatic. It blooms and ripens between Early Burlat and Bing. The tree is slightly smaller than most sweet cherry trees, with an upright growth habit. It is very productive.

This information was taken from the third edition of *The Brooks and Olmo Register of Fruit and Nut Varieties*, published by the American Society for Horticultural Science Press.

From Good Fruit Grower, May 15, 1997

APPLES UNDER PLASTIC
by Derry Walsh
as printed in Pomona, Winter, 1996

On Feb. 25, my husband built a roof over five adjacent trees in my 21 tree row of M9/Wilmutta Jonagolds. This was a clear, colourless, 6 mil (vapor barrier plastic roof only—no sides. This was before the "silver tip" stage of leaf development. The leaves burst, the blossoms opened Apr 26-May 7, and after 'June drop', I had 5.7 times more apples/tree under shelter. Why? Was the temperature slightly higher under the shelter? Was there less wind? Was it raining for some/most of these days of bloom and the bees preferred the shelter? Did the shelter cause these five trees to bloom earlier? Was the weather better at this earlier date? More questions than answers at this stage.

The summer progressed and I did have aphids on the new growth of the sheltered trees which went untreated, but I had big healthy leaves and beautiful apples—smooth, clear skin, good size, but slow to colour. I sprayed the unsheltered trees once with a fungicide, and I squished all bad bugs (no insecticides used).

At harvest in late September, my unsheltered trees were 50%-60% red, but mt sheltered trees were only 30%-40% red. For colour in JOG, one needs 10-20° C in daytime in the month prior to harvest, plus some near to freezing overnight lows. In September, 1995, the lowest daytime temperature in the Fraser Valley was (about) 21°C and the overnight lows were 8-14°C, so it was a bad year for colouring Wilmutta JOG. All had soluble solids of 12-14% and the iodine test showed complete absence of starch. (An orchardist in the Fraser Valley feels that the starch test is not a good maturity test west of the Cascades). Those who ignored the test and left the apples on the trees until late October did get good colouring.

After harvest, and after discarding culls, I harvested 50lbs/sheltered tree (5 trees) versus 7 lb/unsheltered tree (16 trees). The only reason for culling in the sheltered trees was for aphid damage (small deformed fruit), but the reasons for culling the open fruit were scab, bird pecks, plant bug bites, deformed from incomplete pollination, sunscald, and small size.

The next puzzlement? Under the shelter, the apples which turned the reddest the earliest were the apples which never saw the direct sun. They only received filtered sun (through the plastic). Why did they turn red earlier than those exposed to direct sun? I bagged a couple of apples exposed to rain near the edge of the shelter and when the bag was removed, these apples (exposed to direct sunlight) turned bright red within 48 hours. Why? Can someone explain to me how/why an apple turns red? Or can you give me a reference and I can look it up?

Derry Walsh is a WCFS member living in Canada. Hopefully, someone has responded to her request and sent her some answers. However, in the event her questions have received no reply and you know the answers, you may write to her at: 24915 19th Ave, Aldergrove, B.C. V4W 2E6, Canada.

Derry, how did your sheltered vs. unsheltered trees do since you wrote the above? The Bee Line would be happy to print your observations and results.

**OLD APRICOT VARIETIES STAND
THE TEST OF TIME**

The Wenatchee Moorpark apricot, still a major variety in the 1990s, has been the leading variety produced in the district since it was propagated in 1885 by Peter Wheeler, Sr., who homesteaded on Wheeler Hill, now known as Wenatchee Heights.

Apparently, Wheeler sent for a few fruit trees to plant on his homestead, and one turned out to be a seedling apricot. When it began to bear, the quality was so exceptional that many young trees were budded or grafted to this variety, and it soon became the district's leading variety.

Another high quality apricot variety, which is still popular today, was propagated near Wenatchee, at Rock Island, in the 1920s. Perfection was propagated by H. Yount from a seedling found growing in a residential lot in Waterville. It is supposed that someone had discarded the pits or seeds when canning apricots. Perfection proved to be good for long-distance shipping, and would hold up without decay when shipped in iced cars as far as New York.

Perfection is still the top apricot variety planted in Washington today, accounting for 600 out of the state's 1,400 acres of apricots, according to the most recent tree fruit survey.

The earliest plantings of apricots were in southeastern Washington, but by 1910, production had shifted to central Washington. By 1950, Yakima County had half the state's apricot trees.

Apricot production began to decline in the 1960s, when the state was producing a total fresh crop of about 7,000 tons. Production was down to just over 1,000 tons in 1981 but has climbed back to more than 5,000 tons in recent years.

The 1996 crop, however, was badly affected by the January freeze. The Washington State Fruit Commission estimated a crop of only 2,100 fresh tons and 200 processed, for a total crop of 2,300, down from 6,100 in 1995.

THIS SPACE AVAILABLE

Do you have too many tools of one kind and want one of another? Mention it here and someone out there may have a trade for you.

Write to: Western Cascade Fruit Society
c/o Evelyn Troughton
2625 13th Ave W Unit 306
Seattle, WA 98119

GROWING APPLES IN CONTAINERS

by Dick Tripp

as published in Pomona, Spring 1997

Some years ago when I first got interested in growing tree fruit, I quickly used up all of the suitable growing sites in my garden. As a beginner, my choice of varieties was dependent on stock that was available in the nurseries. Being at the mercy of the retailer, coupled with my lack of expertise, resulted in my ending up with: Cox's Orange Pippin, Newton Pippin, Criterion, Fameuse, Summerred, and Northern Spy. Although excellent apples, they are not suitable for my area.

Since I was still interested in growing apples, I had to come up with an alternative to growing in the ground. When I discovered M-27 and P-22 rootstocks and sources of scionwood, I knew I had hope. Since my winters are mild, for the most part, I decided to utilize M-27 rootstock. In addition to trees from nurseries, I grafted scarce varieties that I thought would do well here. I tried to focus on apples that had a certain degree of disease resistance.

Initially, the container used was a half whiskey barrel. It was quite suitable when the price of half-barrels was in the neighborhood of \$6.00. Now that they have risen to the \$19.00 range, they are no longer an economically worthwhile option. Instead, I now use two types of plastic containers—the Classic #8000 (20" x 17", with a grip lip, and a 20 gallon capacity), or a classic #10000 (22½" x 18", with a grip lip and a 25 gallon capacity.) I use the larger container with the more vigorous apple varieties.

The soil used was a mixture of compost, nursery mix, manure, peat and perlite. A handful of bone meal and 5-10-10 was included. Staking was done, either by a pole in the pot or by inserting limb spreaders between the trunk and the edge of the pot. Either technique seemed to secure the tree quite well. During fruit production, care had to be taken as the limbs needed extra support to keep branches from breaking under the weight of the apples. Some thinning was essential on some varieties to obtain size. Apples that are tip-bearers also seemed to present the most support problems.

During the growing season, I feed with a high-potash liquid fertilizer every two weeks from blossom time until shortly before harvest. It is also essential to water more frequently than would be necessary for trees planted in the ground. However, having the containers dry out has never been a problem for me. So far, the yields have been between 7 and 16 pounds for me. Coop-25 and Honeycrisp have been the high producers and Karmin de Sonnaville and Enterprise the lowest.

The following varieties are now fruiting for me:
William's Pride—high yield, excellent summer apple
Monark—moderate yield, squirrels love them
Dayton—moderate yield, good September apple
not a good keeper
Redfree—moderate yield
Swiss Gourmet—low yield

Liberty—high yield, though very small fruits this year
Coop-25—high yield, late September apple—a favorite in our house

Pristine—low yield so far, tree seems to be in growth mode rather than fruit production

Stellar—low yield so far, late October; might do well here

Honeycrisp—high yield, slightly undersized this first production year, excellent apple

Karmijn de Sonnaville—low yield on two trees, an excellent apple and a good keeper

Brown Russet—low yield, late October

Hudson's Golden Gem—low yield, late October

Enterprise—low yield, tree in growth mode rather than fruit production

In addition to my having young trees of four to five years of age, 1996 was not a good year for fruit production in our area. A wet spring, no bees, and a cool summer all contributed to the above results.

After harvest the containers are easily taken from their sunny site to a sheltered area outside for winter protection.

Dick Tripp is a WCFS member. On July 26 at 10:00 a.m. Seattle Tree Fruit Society is having a field trip to Dick's "orchard". Those of you interested in container planting would be welcome. Dick's address is: 11012 239th PI SW, Edmonds. Phone: (206) 546-2724.

WHAT WILL THEY COME UP WITH NEXT?

A weed sprayer system that uses advanced optics and computer circuitry to detect weeds has been introduced for commercial orchardists. The Weedseeker spray system senses weeds by detecting chlorophyll. When a weed is sensed, the system directs the appropriate nozzle spray. It has a series of nozzles that spray independently. Typically, two to four nozzles are placed along each end of a boom. The boom is sized according to the orchard or vineyard spacing.

The Weedseeker is designed for weed control in orchards and vineyards. Its most popular use has been weed control along berms. According to the manufacturer, chemical use can be cut by 60 to 80%.

WCFS MEMBER MAKES THE FRONT PAGE

Ed Jones, best known to us as president of Tahoma Chapter, was featured on the front page of The News Tribune's 50+ edition May 1, 1997. I quote, 'You don't have to be a rocket scientist to become a master gardener, but it's OK if you are.'

'Now retired from Jet Propulsion Laboratory in California, he digs in the dirt and answers the questions of curious and frustrated gardeners at WSU master gardener plant problem clinics.

'Jones, 72, rattles off commentaries about rockets and space telescopes in one breath and describes the art of trapping moles in the next. One moment he's describing the design for a hydrogen automobile, and the next he's pointing proudly to a cold frame rigged with used windows in his Puyallup garden.'

PEST MANAGEMENT AFFECTS THE WHOLE ORCHARD SYSTEM

by Geraldine Warner—Good Fruit Grower March 15, 1996

Pest control techniques have changed dramatically over the years, and control in the future looks increasingly complex

Changes in pest management practices over the years have generally followed changes in understanding of the impacts of those practices

Dr. Mike Willett, WSU Cooperative Extension horticulturist in Yakima, speaking at a seminar on environmental chemistry and ecology of pesticides, said an understanding has evolved that pest management affects the whole orchard system, not just the specific pest targeted for control.

The pesticide lead arsenate came into use in Washington in about 1910, not long after the tree fruit industry was established. It was a broad-spectrum material that, together with oil, gave good suppression of most pests, including codling moth.

However, resistance soon developed, and by the 1930s and 1940s, growers were spraying frequently and still losing a lot of fruit to worms. There was also the problem of residues on the fruit that were difficult to remove. It is only recently that another impact of the widespread use of lead arsenate has been felt. Residues that still persist in the soil of many orchards may be above clean-up standards for arsenic and lead set by the State of Washington.

DDT, which became commercially available in 1946, replaced lead arsenate. "Control was remarkable," Willett said. "Growers went from having 10 to 20% worms, to having no damage at all. Some entomologists were quoted as saying insects were probably not a going to be a problem at all. Of course, they've since had to revise that estimate."

DDT gave improved control at low cost, and was considered at first to be safer than lead arsenate. But there were some unforeseen impacts of using DDT. Resistance and resurgence of pests soon became a problem. Codling moth was showing resistance to DDT as early as 1951.

Then, as growers became alarmed when the leaves on their trees turned brown, it turned out that DDT had eliminated the beneficial mites that were controlling pest mite species, resulting in a huge resurgence of mites. In the early 1960s, Dr. Stan Hoyt identified the beneficial species that had suppressed spider mites and found that by using specific materials at timings that allowed the predators to survive, growers could maintain mite control.

"All of a sudden, they had to think about not only the pest they were trying to control, but they had to think about this beneficial that was in the system that they didn't even know was there," Willett said.

As resistance to DDT grew, new types of pesticides were developed, including organophosphates and carbamates, but pests developed resistance to those materials also. One of the major drawbacks of those classes of chemicals is

that they are more toxic to humans than materials used before.

Rachel Carson's book *Silent Spring*, published in 1962, forced growers to consider the impacts of pest control practices beyond the orchard, something they had not considered before because they had not seen effects from the materials they used before.

However, it was primarily the realization by producers that they could not rely on pesticides to provide 100% control that led to the development of integrated pest management (IPM), Willett said, although minimizing the environmental impact is part of it.

A number of different definitions of IPM have been put forward over the years. In 1959, it was described simply as "applied pest control which combines and integrates biological and chemical control."

The National Coalition on IPM, in 1994, brought people and the environment into the equation, describing IPM as "a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks."

In Willett's view, IPM is "an ecologically-based pest control philosophy which combines an understanding of pest biology and ecology with appropriate biological, cultural, and chemical management tactics to reduce pest populations and maintain them below economic injury levels."

IPM is a philosophy, rather than a specific practice, he said. Unless people can find a way to adapt the technology to fit their situation, they will not use it.

"It's got to be more a way of looking at things, rather than a rigid way of doing things," he said.

Even the economic injury level is somewhat intangible, he asserted. "The economic injury level is a great concept theoretically because it says the crop is worth so much, treatment worth so much, and you are only going to have to treat when you lose so much.

"However, in practice, it's really hard to set economic injury levels, particularly in perennials, when you don't know in June the value of a crop that's going to be sold in June the following year. I don't think people managed codling moth less in 1995 when prices were low because the fruit was not going to be worth so much."

Many growers are still primarily managing pests based on population level, he said, but as they use smaller amounts of more selective pesticides, the complexity of the system increases, because there are more pests and predators to consider.

"The question is, can you manage that complexity?" he said. "It becomes more difficult."

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SUSAN BARRETT, S Puget Sound*	360-264-2508	17701 Mima Acres Dr SE	Tenino	98589
TIMOTHY DRIVER, S Puget Sound*	360-866-4556	1747 Starview Ln NW	Olympia	98502
ED JONES, Tahoma	206-770-3711	6810 Bentley Rd E	Puyallup	98371

*Co-Presidents

NEWSLETTER EDITOR

Evelyn Troughton	206-282-6191	2625 13th Ave W #306	Seattle	98119
FAX	206-283-1944			

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.
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NEXT NEWSLETTER OCTOBER 1997

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!

Do you like the 2 column format? Yes _____ No _____ Didn't notice _____ Doesn't matter _____

What would you like to read about? _____

Please be specific

What changes would you make in The Bee Line? _____

What changes would you like to see at the Fall Fruit Show? _____

What changes would you suggest for the Spring Sale/Meeting? _____

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? _____

Why have you decided not to renew? _____

Any other comments? _____

WESTERN CASCADE FRUIT SOCIETY MEMBERSHIP INFORMATION

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

Name(s) _____ () New
() Renewal

Street Address _____

City, State, Zip _____

Phone _____ PLEASE SPECIFY ONE CATEGORY BELOW

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

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

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

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

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

Apples Pears Peaches Plums Cherries Kiwis Nuts Berries Other: _____

Make checks payable to WESTERN CASCADE FRUIT SOCIETY and mail to:
WCFS Treasurer, 2625 13th Ave W - Unit 306, Seattle, WA 98119-2054

**SUMMER 1997
YOU'LL FIND IT HERE!**

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**WESTERN CASCADE FRUIT SOCIETY EDITOR
2625 13th Ave W. Unit 306
Seattle, WA 98119-2054**

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