S105
E55
rev
no.41
cop.2
OREGON STATE UNIVERSITY LIBRARIES
12 0141869947
S
105
.E55
no.417
rev.1976
cop.2

Oregon Tree Fruit and Nut Research Abstracts

COMPACT

1972-1975

JUN 1976
LIBRARY
OREGON STATE
UNIVERSITY

SPECIAL REPORT 417
[Revised]

MAY 1976

Agricultural Experiment Station
Oregon State University
Corvallis

S
105
.E55
no. 417
rev. 1976
cop. 2

Oregon Tree Fruit and Nut Research Abstracts
1972-1975
(Supplement to Ore. Ag. Exp. Sta. Spec. Rpts. 341, 355 and 417)

Compiled by M. N. Westwood

Introduction

The index which follows is complete through 1975 and includes all of the abstracts from Special Reports 341, 355 and 417 plus items 408 through 476 of the attached supplement. For best use of the abstract supplement, it should be attached to Special Reports 341, 355 and 417.

As was done with the earlier compilations, full reprints of papers 408 through 476 will be filed under the same numbers in the libraries of the Branch Stations at Hood River and Medford and in the Horticulture Department library at Corvallis. This is done for the convenience of extension workers and others who might need to study the full report from which the abstract was taken.

Index to
Tree Fruit and Nut Research Abstracts 1962-1975
Oregon State University

I. APPLE — Abstract serial number

Continued from page 92 of Ag. Exp. Sta. Spec. Rpt. 417.

PAPER ABSTRACTS

408.Shearer, Marvin N. 1975. Removing suspended solids from irrigation water. Int. Drip Irrig. Assoc., October, 3 pp.---An analysis was made of the effective particle size distribution of sediments found in drip irrigation laterals and the management practices associated with the function of these laterals. It was concluded that filtering to remove particles of fifty to sixty microns and larger and a scheduled lateral flushing program could solve the drip lateral plugging problem caused by mineral sediments. It was also concluded that straining and filtering practices normally used with drip systems were not adequate to eliminate the problem without flushing.

409.Kirk, Dale E., Dean E. Booster and Leland C. Jensen. 1974. Identifying damage sources in mechanically harvested sweet cherries. Pac. NW Reg. Amer. Soc. Agr. Eng., paper no. 74-34, 3 pp.---Data on the various mechanical harvesting parameters were observed on 120 sweet cherry trees in 20 separate orchards in Western Oregon. The data included tree geometry, fruit distribution, time and weather data, fruit maturity measurements, stem counts, fruit damage and measurements of energy input to the tree by the shaking machine. Accelerometers attached to the tree trunk during shaking gave patterns of operator control, tree movement patterns and intensity of shake. The reduced overall damage observed by growers and processors during the 1975 harvest season left little room to distinguish the major damage contributing factors. Many growers, upon seeing the summarized output data decided to increase the size of weights in their shaking machines and thus increase their shaking forces for the following season.

410.Berlage, A. G. and R. D. Langmo. 1974. Trunk shaker harvesting of apples surrounded by plastic spheres. Amer. Soc. Agr. Eng. Winter Mtg., paper no. 74-1522, 12 pp.---Red and Golden Delicious apple trees were enclosed in a straddle-frame harvester. The harvester enclosure was filled with hollow plastic spheres before trunk shaking. Time studies and bruise evaluations showed that harvesting with spheres slightly improved fruit quality but greatly increased harvesting time.

411.Berlage, A. G. and R. D. Langmo. 1974. Harvesting apples with straddle-frame trunk shaker. Amer. Soc. Agr. Eng. 17(2):230-234.---The Pacific Northwest produced approximately 50 percent of the Nation's 1972 Red and Golden Delicious crop (Kitterman and Albrecht 1973). With such a concentration of two varieties harvested at essentially the same time, mechanically harvesting this volume of apples becomes an important consideration for the fresh market apple industry. The potential of a straddle-frame, shake-and-catch harvesting system for fresh market apples grown in a treewall (hedgerow) was investigated. A straddle-frame previously used to test an air-blast harvesting system (Berlage

1972) was redesigned to support a trunk shaker, fruit catching frame, conveyor, and bin filler. The machine was field tested. Apple bruise damage and performance time studies were evaluated. Cullage was too high for commercial use.

412. Doran, Samuel M. and A. Gene Nelson. 1974. Analyzing the orchard enterprise. Ore. State Univ. Ext. Serv. Spec. Rpt. 344,17 pp.---No two orchard enterprises are alike. They differ in topography, location, and climatic conditions. Horticulturally, they differ because of the nature of the crop, the varieties involved, tree age and spacing, and problems with soil, water, and pests. They also differ because of the availability of labor and the market for which the crop is being produced. Each of these many factors has an effect on the operation and management of an orchard, its costs, and the annual income. Orchards are also changed from time to time. Old trees are replaced with different types of fruit or newer varieties. Many orchards are being enlarged. New machinery and different production practices are developed and adopted. As a result, orchardists periodically need to determine the effect of such changes. Analyzing an orchard operation is more difficult than analyzing an annual cropping operation, but it may also be more important. Many years are required to bring an orchard into profitable production. Practices carried out during the establishment of an orchard may affect that orchard for the next 20 years or more. Therefore, the manager needs to determine the effect of current and previous operational practices on each block, or enterprise, that makes up the total orchard. The purpose of this handbook is to provide a step-by-step procedure for analyzing orchard operations using a computerized analysis program. This program can be used to analyze the entire orchard, or the orchard can be divided into various fruit and nut enterprises for separate analysis. Also, each orchard block can be analyzed as a separate enterprise.

413. Shearer, Marvin N., Porter B. Lombard, Walter M. Mellenthin, Lloyd W. Martin, Kenneth K. Kangas, Scott Kelly and C. Y. Wang. 1974. Drip irrigation research in Oregon. Agr. Exp. Sta. Spec. Rpt. 412, 28 pp. ---Trickle systems were installed on pears, apples, and blackberries in 1973. Comparisons were made with conventional surface and sprinkler irrigation systems. Trickle irrigated pared pears had lower pressure test values than surface irrigated pears, however, little difference was measured in fruit size and yield. No apparent difference in maturity or storage characteristics was found between fruit that had been trickle irrigated and sprinkler irrigated. Substantial water savings were made with trickle systems in place of sprinkler or surface systems. It appeared that K values relating water loss from a class A pan to crop water requirements may be closer to 1.0 than 0.6 or 0.7 which are generally used.

414. Shearer, Marvin N., Porter B. Lombard, Walter M. Mellenthin, Lloyd W. Martin, C. Y. Wang and Scott Kelly. 1975. Oregon's drip irrigation: 1974 research report. Agr. Exp. Sta. Spec. Rpt. 444, 14 pp.---Two

years' data on drip irrigation systems operating in mature pears, apples, and blackberries indicate the K value relating water loss from class A evaporation pans to irrigation requirements was approximately 1.0 when applied to the area under the plant canopy. Tensiometers were used to monitor soil moisture and identify refinements needed in scheduling programs. For the second year, there was no significant difference in the occurrence of fruit mold on sprinkler and drip irrigated evergreen blackberries. Water savings with drip irrigation compared to furrow irrigation in mature pears with partial ground cover ranged from 10 to 20 percent; with drip irrigation compared to sprinkler irrigation in mature pears with complete ground cover, the saving was 45 percent; with drip irrigation compared to sprinkler irrigation on six-year-old evergreen blackberries, the saving was 33 percent. Drip irrigated blackberries matured earlier than those sprinkler irrigated with no observable detrimental effects in yield or quality. Drip irrigated Bartlett pears reached comparable maturity one week earlier than those furrow irrigated. At harvest, drip irrigated pears were slightly larger but 5 percent were over-mature.

415.Mellenthin, W. M. and C. Y. Wang. 1974. Friction discoloration of 'd'Anjou' pears in relation to fruit size, maturity, storage and polyphenoloxidase activities. HortSci. 9(6):592-593.---Small 'd'Anjou' pears (Pyrus communis L.) tend to be more susceptible to friction discoloration than the large fruits. Susceptibility to friction discoloration decreased with maturity but increased with duration of storage. Phenolic substances which are associated with friction discoloration and which serve as the substrate for polyphenoloxidase also declined with maturity and accumulated in storage. However, polyphenoloxidase activities increased with maturity and decreased during storage. The accumulation of phenolic compounds may be a result of the low polyphenoloxidase activities in storage.

416.Beavers, D. V., C. H. Payne and R. F. Cain. 1975. Effect of added alum on the quality of brined Royal Ann cherries. J. Food Sci. 40: 692-694.---The effect of including alum $[AlK(SO_4)_2]$ in the initial brine for Royal Ann cherries was evaluated for certain brined cherry quality factors. Increasing amounts of added alum significantly reduced the brine shrink, decreased the total loss, and lowered the equilibrated brine pH. No significant differences were shown for percent unpitted fruit, pits, pitting loss, soft fruit, texture and solution pockets. In some instances, significant differences due to maturity were shown. Cherries were colored with FD&C Red No. 3 and 4. With Red No. 3, cherries containing more than 2% added alum could not be satisfactorily colored due to bleeding. No difficulty was encountered when coloring with Red No. 4.

417.Benjamin, N. D. and M. W. Montgomery. 1973. Polyphenol oxidase of Royal Ann cherries: purification and characterization. J. Food Sci. 38:799-806.---Polyphenol oxidase (o-diphenol: O_2 oxidoreductase, EC

1.10.3.1) was purified from freeze-dried Royal Ann cherries by extraction with polyethylene glycol and acetone. The acetone powder was extracted with 0.05M acetate (pH 5.6) and the polyphenol oxidase was precipitated with acetone. Chromatography on DEAE-cellulose and Sephadex G-100 partially separated the acetone precipitate into two and three fractions, respectively. This suggests that the polyphenol oxidase had different molecular sizes. The two fractions from DEAE-cellulose had similar sensitivities to inhibitors, pH optima, V_{max} and K_M, but differed in substrate specificity and heat stability. Polyacrylamide-gel electrophoresis separated the polyphenol oxidases into three groups containing five, three and one components. All three groups possessed similar substrate and inhibitor specificities. The polyphenol oxidase system of Royal Ann cherries appears to be composed of three enzymes. Two of these enzymes have isozymes.

418.Zwick. Robert. 1974. What's in the future for insect control in apples and pears. Proc. Ore. Hort. Soc. 65:38-39.---Resistance to formerly effective psyllacides have increased the problems of controlling pear psylla. Other approaches to pear psylla control such as juvenile hormone mimics, parasitic and predaceous Hymenoptera and Hemiptera are being investigated. Other areas of research include dispersal methods with concentrate and low volume equipment and the effectiveness of predatory mites against spider mites on apples.

419.Zwick, R. W. 1975. Pear psylla control. Proc. Ore. Hort. Soc. 66: 129-130.---Increased tolerance to the dormant Perthane-endosulfan application coupled with high overwintering populations has made the use of Morestan in the pink bud application very important. An alternative program, as yet under investigation, is a dormant oil spray to reduce egg oviposition. Summer covers of chlordimeform will be necessary and are still effective. Overhead sprinklers reduce honeydew russet, but do not control psylla populations.

420.Zwick, R. W., G. J. Fields and Ulo Kiigemagi. 1975. Dimethoate for control of western cherry fruit fly on sweet cherry in Oregon. J. Econ. Ent. 68(3):383-385.---Dimethoate (2.67 lb AI/gal EC) was evaluated on heavily-infested backyard sweet cherry trees and in lightly-infested commercial cherry orchards for control of Rhagoletis indifferens Curran. A single dilute application at rates of 0.33 and 0.51 lb AI/ 100 gal 31-56 days preharvest gave excellent control during 1971-72 and 1974 field tests. Bioassay tests against adult western cherry fruit flies with several registered and nonregistered contact insecticides indicated dimethoate to be the most effective and persistent compound evaluated. Residues of dimethoate on cherries were collected 2 years and were within currently registered tolerances for this material on pome fruits. Phytotoxic effects including marginal foliage necrosis and minor defoliation in 1974 field tests were noted but are not considered serious.

421.Fields, G. J. and R. W. Zwick. 1975. Elimination of ovarian diapause in pear psylla, Psylla pyricola (Homoptera: Psyllidae), in the laboratory. Ann. Ent. Soc. Amer. 68(6):1037-1038.---Breaking ovarian diapause in hibernal form pear psylla delays laboratory studies requiring immature forms. Subjecting field collected summer form adults of the last summer generation to long photoperiods and temperatures more than 10°C above ambient prevented diapause. A simple greenhouse rearing facility provided immature forms throughout the winter until diapause was terminated in the field.

422. Westigard, P. H. and D. W. Berry. 1975. Pear psylla control in Southern Oregon. Proc. Ore. Hort. Soc. 66:131-136.---The pear psylla is at present the most important pest in Northwest pear orchards. Several methods have been evaluated to achieve commercial control of this species, including the use of natural enemies, cultural control and chemical control. Of these, only chemical control is widely used by growers, but because of widespread resistance to several pesticide groups even this method has become unreliable and expensive. The use of more precise timing of spray applications will be necessary to achieve commercial control. The results of field tests to evaluate best spray timings and promising experimental compounds are given.

423. Westigard, Peter H. 1974. Control of the pear psylla with insect growth regulators and preliminary effects on some non-target species. Environ. Ent. 3(2):256-258.---Two insect growth regulators (IGR) ZR-512 (Ethyl 3,7,11-trimethyldodeca-2,4-dienoate) and ZR-515 (Isopropyl 11-methoxy-3,7,11-trimethyldodeca-2,4-dienoate) were evaluated for their control of the pear psylla, Psylla pyricola Förster, and for their effect on nontarget pear pests and predators. Under laboratory conditions, adult psylla exposed to residues of IGR's failed to lay viable eggs, though the number laid and the general appearance of eggs seemed normal. Adult psylla from late-instar nymphs which were exposed to ZR-515 failed to lay viable eggs. In field tests no direct reduction in adult psylla levels was observed following application with IGR's, but 3 weeks post treatment the ratio of psylla eggs per nymphs was much greater in these plots. The effect of IGR's was minimal on other pest species, and no significant decrease in predator species was noted.

424. Westigard, P. H., Ulo Kiigemagi and P. B. Lombard. 1974. Reduction of pesticide deposits on pear following overtree irrigation. HortSci. 9(1):34-35.---Overtree irrigation of pear trees following application of pesticides by speedsprayer resulted in lowering most insecticide deposits by 30-90%. Addition of a spreader sticker to pesticide sprays did not reduce pesticide loss.

425. Westigard, P. H. 1975. Population injury levels and sampling of the pear rust mite on pears in Southern Oregon. J. Econ. Ent. 68(6):786-790.---Epitrimerus pyri (Nalepa) overwinters in sheltered areas, primarily on 2- to 3-yr-old pear wood. A very small percentage of the population was found on 1-yr-old wood, probably reflecting lack of protected sites on this area. Emergence from overwintering sites was following by movement to the developing fruit buds. Basal portions

of the fruit cluster are invaded 1st with pear rust mites reaching the fruit during the bloom period. Though the mite was found on the fruit during the entire growing season, the proportion of the population on this site decreased, whereas that on fruit cluster leaf tissue increased through the summer. Pear rust mite densities were higher through the entire season on fruit taken from the upper sections of trees than those selected from lower portions. In June or July, a pear rust mite density of 5 or more/fruit was sufficient to cause economic damage, but there was an indication that higher populations could be tolerated earlier in the growing season.

426. AliNiazee, M. T. 1974. Chemicals for control of the western cherry fruit fly. Proc. Ore. Hort. Soc. 65:109-110.---Three chemicals were tested for the control of the western cherry fruit fly in the Willamette Valley. Cygon and Furadan were applied twice at the rate of 0.25 lb AI/100 gallon of water and compared with five spray schedule of diazinon at a rate of .125 lb AI/100 gallon. Results indicate that two sprays of Cygon and Furadan were as effective as 5 sprays of diazinon. Both Cygon and Furadan have no registration for use on cherries.

427. AliNiazee, M. T. and R. D. Brown. 1974. A bibliography of North American cherry fruit flies (Diptera: Tephritidae). Bull. Entomol. Soc. Amer. 20(2):93-101.---A comprehensive bibliography of 3 species of North American cherry fruit flies has been developed. About 430 references dealing with various aspects of cherry fruit fly biology, ecology and control are listed. The species covered are the western cherry fruit fly, Rhagoletis indifferens, the cherry fruit fly, Rhagoletis cingulata, and the black cherry fruit fly, Rhagoletis fausta.

428. AliNiazee, M. T. 1974. The western cherry fruit fly, Rhagoletis indifferens (Diptera: Tephritidae). 1. Distribution of the diapausing pupae in the soil. Can. Ent. 106:909-912.---Field studies conducted in cherry orchards of the Willamette Valley, Oregon, indicate that diapausing pupae of the western cherry fruit fly, Rhagoletis indifferens Curran, overwinter in the soil at a depth of 1-4 in. Relatively very small numbers of pupae were collected from surface debris and soil samples taken at a depth of 6 in. and below. The number of flies emerging from different soil depths indicated that removal of the top 6 in. of soil caused a 99% reduction in adult emergence, while the removal of the top 1 in. of soil had no effect.

429. AliNiazee, M. T. 1974. Evaluation of Bacillus thuringiensis against Archips rosanus (Lepidoptera: Tortricidae). Can. Ent. 106:393-398. ---Three formulations of Bacillus thuringiensis Berliner, preparation Thuricide® were evaluated against a commonly occurring leafroller, Archips rosanus (L.), on filberts. In the laboratory at $26.7 \pm 1^{o}C$, all larvae died within 7 days after feeding for 48 h on filbert leaves treated with dust and wettable formulations. With aqueous concentrate, the mortality was slightly less. Insect susceptibility was markedly reduced when the length of feeding exposure period was decreased. In

the field, the infestation of A. rosanus was significantly reduced within a week after treatment in almost all the treated plots. Larval mortality continued for about 4 weeks. Under western Oregon conditions, dust treatments were slightly better than wettable or aqueous concentrate formulations.

430.AliNiazee, M. T. 1974. The western cherry fruit fly, Rhagoletis indifferens (Diptera: Tephritidae). 2. Aggressive behavior. Can. Ent. 106:1201-1204.---Aggressive behavior of the western cherry fruit fly studied both under laboratory and field conditions indicates that males are extremely territorial, especially in the field, where they do not tolerate the presence of another fly on a cherry unless the invader is a mating partner. Under confined laboratory conditions, the sense of territoriality was markedly reduced. Aggressive behavior in this insect included a wing jerking display, head-on collision, and "boxing" (fight involving prothoracic legs).

431.AliNiazee, M. T. 1975. Susceptibility of diapausing pupae of the western cherry fruit fly (Diptera: Tephritidae) and a parasite (Hymenoptera: Diapriidae) to subfreezing temperatures. Environ. Ent. 4(6):1011-1013.---The diapausing pupae of the western cherry fruit fly, Rhagoletis indifferens Curran, and its major parasite, Psilus sp., were exposed to different temperatures for various lengths of time to determine their susceptibility to extreme cold temperatures. Both the fruit fly and the parasite showed a high degree of tolerance to sub-freezing temperatures. They survived almost all tested (16-48 days) exposures at -4°C, and certain shorter (16-36 days in non-soil and 16-48 days in soil) exposures at -10°C. The exposure of both these groups of insects to -16°C resulted in high mortality (82-100%) and a drastic reduction in adult emergence. Data indicate that temperature fluctuation during winter months might give a reasonable predictive indication of the size of the cherry fruit fly population for the following summer.

432.Moore, L. W. and René V. Carlson. 1975. Liquid nitrogen storage of phytopathogenic bacteria. Phytopathology 65(3):246-250.---A simple, uniform method of culture storage in liquid nitrogen was developed to preserve selected species of Agrobacterium, Corynebacterium, Erwinia, Pseudomonas, and Xanthomonas. Survival of cells was generally enhanced by suspending them in 10% skim milk before freezing and storage. However, the most convenient procedure was to freeze and store all species except the "soft-rotting" types in the culture medium in which they were grown. Regardless of the nature of the suspending fluid, the viability of rapidly-frozen cells usually declined immediately after freezing, but remained stable thereafter through 12 and 30 months of storage at -172 to -196 C. By contrast, viability dropped rapidly over a 6-month period for several species stored at -20 C, but survival was enhanced in 10% skim milk. Pathogenicity was unaffected by storage under liquid nitrogen.

433. Moore, L. W., H. B. Lagerstedt and N. Hartmann. 1974. Stress predisposes young filbert trees to bacterial blight. Phytopathology 64(12):1537-1540.---The effect of cultural and environmental stress on filbert tree mortality was evaluated in two newly planted orchards. Nonirrigated trees inoculated with Xanthomonas corylina had a high mortality during the second summer after planting. Irrigation significantly reduced mortality of the trees. Tree mortality did not differ significantly between treatments used to prevent sunburn of tree trunks and untreated controls at the Corvallis planting site. However, the use of a reflective paper collar to protect the trunk at Rickreall harmed the trees because sunlight reflected from the surface of this collar injured the trunk and resulted in greater mortality. Summer pruning of trees in the nursery enhanced callusing of the pruning wound of noninoculated trees, but resulted in trees of small diameter. More of the smaller summer-pruned trees died from blight infections after outplanting than did the larger winter-prune nursery trees. Sealing the pruning wound to prevent entry of the pathogen into noninoculated trees also enhanced callusing, but did not influence mortality of noninoculated trees exposed to naturally occurring inoculum. At Rickreall, X. corylina was recovered from discolored and apparently healthy tissues of trees 48 months after inoculation, but none was recovered from tissues of the noninoculated trees that were sampled. In conclusion, the most important factor in reducing mortality of newly established filbert trees infected with X. corylina is adequate irrigation the first 2 to 3 years after planting.

434. Cameron, H. R. 1974. Filberts: Yesterday's disease strikes again. Ore. Agr. Prog. 21(2):5.---A long-sleeping menace to the filbert industry has awakened. Eastern Filbert Blight, a fungus disease, was recently discovered in orchards of two Washington counties. Later, blighted trees were discovered across the Columbia River in one orchard near St. Helens in Columbia County, Oregon. The all but forgotten disease can kill orchards and seems likely to spread if not identified and contained. It once devastated filbert orchards in the Eastern United States, but a quarantine imposed in 1923 kept the disease from spreading west of the Rocky Mountains. No case of the blight had been recorded in European filberts since 1937 until the recent outbreak in the Northwest. How Eastern Filbert Blight managed to reappear in Oregon and Washington now is unknown. However, a cooperative study between Oregon State University, Washington State University, the State Departments of Agriculture in both Oregon and Washington and the Oregon Filbert Commission is now underway to identify how the disease functions and check its spread.

435. Cameron, H. R. 1974. The pear replant problem. Proc. Amer. Phyto. Soc., vol. 1.---Pear trees planted on sites previously planted to pears frequently grow slowly and are 4-5 years late coming into commercial production. Two hundred, 30 year old, pear trees were removed. The site was left fallow for one year during which it was sampled for clay and mineral content, fungi and parasitic nematodes. Species of

Phytophthora, Pythium and Pratylenchus were the most common pathogens present. There was no evidence, based on fruit yield, that the occurrence of these pathogens had affected the original trees. Eight treatments, including a control, were applied in the fall of 1967. Each treatment was replicated 9 times and consisted of 25 trees per plot for a total of 225 trees per treatment. Growth rate of trees in treated soil was greater in all cases than untreated controls. Increased growth due to fungicides and nematacides was distinct and additive. Dexon, Vorlex and Lanstan increased trunk cross section area of treated trees over untreated controls by 38 to 50%. Telone, Chemagro 4497 and methyl bromide increased growth by 78-106%. Dexon plus Dasanit and 4497 plus Dasanit increased growth by 105% and 167%, respectively. Tree losses were 12.4% in the 4497 plot due to phytotoxicity. Tree losses were reduced to 0.4% with Dexon as opposed to 6.2% in the untreated controls. Three years after treatment soil fungi and nematode counts had returned to pre-treatment levels. In the 4th year yield of trees on treated soil was double those on untreated soil. Soil treatment materially reduced the pear replant problem.

436.Florance, Edwin R. and H. Ronald Cameron. 1974. Some three dimensional ultrastructural aspects of the mycoplasma-like bodies associated with Albino disease of Prunus avium L. Proc. Amer. Phyto. Soc., vol. 1. ---Mycoplasma-like bodies were found in association with Albino disease of Prunus avium L. Their morphology and structure were studied by serial sectioning, stacking and aligning transparent prints of pertinent sets of serial photographs, and stereo-air photography. These techniques revealed 1) tubular and spherical forms of the bodies, 2) branching of some tubular forms, and 3) an apparent attachment of some bodies to stacked endoplasmic reticulum.

437.Cameron, H. Ronald. 1975. Mycoplasmas and cherry production. 6th Nat. Cherry Res. Conf., p. 10.---Several cherry diseases previously considered to be caused by viruses are now being attributed to mycoplasma-like organisms. This permits the use of some antibiotics for control or remission of symptoms. Injection procedures, labeled clearance, frequency and time of treatment are being investigated.

438.Cameron, H. R. 1975. Eastern filbert blight. Proc. Nut Growers Soc. Ore. Wash. 60:21-23.---Eastern Filbert Blight caused by Apioporthe anomala (Pk) Holhn has become established in the Pacific Northwest in an area 22 miles north of Portland, Oregon. Approximately 20 orchards are infected. The Daviana cultivar is very susceptible; Barcelona and DuChilly moderately susceptible; and Hall's Giant and the native Pacific hazel appear to be resistant. Attempts to control the disease by sanitation and chemicals are in progress.

439.Cameron, H. Ronald. 1975. Bacterial canker: Host versus pathogen. 6th Nat. Cherry Res. Conf., p. 9. The susceptibility of sweet cherry trees to bacterial canker appears to be associated with host metabolism. Temperature, moisture stress and nutritional balance are important. High levels of Mn, Fe and Al ions are associated with susceptible trees.

440. Thompson, Maxine. 1974. Progress towards new filbert varieties. Proc. Nut Growers Soc. Ore. Wash. 59:47-53.---Breeding objectives are reviewed and characteristics of progenies from several of the crosses made from 1967 to 1969 are described. Some general comments are made on the mode of inheritance of several traits such as nut shape, shell thickness, time of maturity, husk type, nut size, nut quality, and big bud mite resistance.

441. Florance, Edwin R. and H. Ronald Cameron. 1974. Vesicles in expanded endoplasmic reticulum cisternae structures that resemble mycoplasma-like bodies. Protoplasma 79:337-348.---Vesicles resembling mycoplasma-like bodies were observed by electron microscopy in healthy, virus-indexed, and heat-treated, phloem parenchyma cells and immature sieve tube elements of *Prunus persica* Batsch. The vesicles contain ribosomes and fibrils, are unit membrane bound, and range from 0.2-0.4 μm in diameter and up to 0.7 μm long. Cross and longitudinal serial sections show that the vesicles arise by the invaginations of endoplasmic reticulum into expanded endoplasmic reticulum cisternae and are actually a normal part of cellular differentiation. It is suggested that conclusions on mycoplasma-like body associations with "yellows-diseases" be based on demonstration of MLB in mature rather than immature sieve tube elements and phloem parenchyma cells.

442. Baron, Lloyd C. and E. Hugh Gardner. 1975. Liming for filbert production in western Oregon. Circ. of Info. 650, 18 pp.---The application of lime to acid soils in the Willamette Valley increased the yield and quality of filberts and growth of filbert trees. Liming increased the uptake of nitrogen and depressed manganese absorption. Pronounced effects of lime on the pH and calcium content of the soil were observed 4 years after liming even in the surface 4 inches of soil. Calcium moved downwards to depths exceeding 8 inches with the translocation of calcium increasing with time. Liming resulted in an increase in the downward movement of potassium in the soil. The application of dolomite lime gave increased magnesium levels at all soil depths over the 4 year period. Soil test trends indicated that the residual effects of lime would persist considerably longer than 4 years.

443. Lagerstedt, H. B. 1974. The Oregon walnut industry: a history of its struggle for survival. Proc. Nut Growers Soc. Ore. Wash. 59:59-63.---The Oregon walnut industry was founded on a great deal of hope and a few erroneous decisions. Some of these erroneous decisions, such as growing seedling trees, planting solid blocks of a single cultivar and using the Northern California black walnut as a rootstock, have been overcome. The principal cultivar 'Franquette' has never been entirely satisfactory, nor has a replacement been found. The 'Franquette' lacks sufficient hardiness to survive the occasional, unseasonal freezes which may occur in Western Oregon. A cool growing season, late spring frosts, early fall frosts, and disastrous wind storms have, through the 90-year history of the industry, made commercial walnut production a risky venture. Until a suitable cultivar can be found, commercial walnut growing in Oregon cannot be recommended.

444.Lagerstedt, H. B. and L. W. Moore. 1974. The carryover effect of young tree care on filbert tree growth. Proc. Nut. Growers Soc. Ore. Wash. 59:31-35.---In two separate trials, the effect of mulching and the effect of different types of sunscald protection were tested on newly planted filbert trees. After 2 and 3 years, respectively, the treatments were removed, and the growth responses were reported as trunk-diameter measurements. Trunk measurements have been taken annually for several years after treatment removal. These measurements indicate that benefits obtained from treatments were sustained or increased even after treatments were no longer in place. The results show the importance of young tree care and the carryover effect of good or bad cultural management practices.

445.Lagerstedt, H. B. and M. M. Thompson. 1974. Evaluations of new filbert selections. Proc. Nut Growers Soc. Ore. Wash. 59:21-25.---The grower selections, 'Butler', 'Ennis', 'Jemtegaard No. 5', 'Lansing', and 'Ryan', named for their originators, were chosen for further testing on the basis of nut and kernel characteristics. Specimens of each selection have been distributed to filbert nurserymen, but trees are not yet available. This progress report is to acquaint filbert growers with these selections by summarizing what is known about their performance and growing characteristics and making recommendations as to their use.

446.Lagerstedt, Harry B. 1975. Filberts. p. 456-489. In J. Janick and J. N Moore (ed.) Advances in Fruit Breeding, Purdue Univ. Press, W. Lafayette, Ind.---This is one of 20 chapters on fruit and nut breeding. The introduction covers filbert history, nomenclature, geographic distribution, Corylus species and some morphological characteristics. The body of the text covers filbert improvement worldwide, U. S. breeding objectives, breeding techniques with special reference to male and female flower development and pollen care. Success and failure of interspecific crossing, breeding for specific characters, rootstock breeding and prospects for future achievements are also covered.

447.Breen, Patrick J. and Tom Muraoka. 1975. Seasonal nutrient levels and peach/plum graft incompatibility. J. Amer. Soc. Hort. Sci. 100(4):339-342.---'Lovell' peach seedlings (Prunus persica Batsch.) and 'Marianna 2624' plum (P. cerasifera Ehrh. x P. munsoniana Wight & Hedr.) were spring budded with 'Fay Elberta' peach or 'Marianna 2624'. 'Fay Elberta'/'Marianna 2624' was the only incompatible graft combination and foliar symptoms of ill-health appeared in early August. Levels of N, P, K, Ca, and Mg in leaves and bark of the peach/plum trees before incompatibility symptoms developed were similar to those of compatible combinations. The concentration of foliar nutrients, however, was relatively low in trees with severe incompatibility symptoms. Foliar N and K levels fluctuated concurrently with the onset of decline symptoms on peach/plum trees. The concentrations of K, Mg, and Ca declined during the season in the scion bark of the incompatible combination but remained relatively unchanged in the rootstock bark. Among the 4 graft combinations, the level of P in the scion bark was greatest in peach/plum trees and its distribution profile down the bark was similar to that of inositol; both accumulated to the highest level immediately above the incompatible union.

448. Breen, Patrick J. 1975. Effect of peach/plum graft incompatibility on seasonal carbohydrate changes. J. Amer. Soc. Hort. Sci. 100(3): 253-259.---Spring-budded trees of peach/plum (Prunus persica Batsch. cv. Fay Elberta on the plum P. cerasifera Ehrh. x P. munsoniana Wight & Hedr. cv. Marianna 2624) showed foliar symptoms of incompatibility in early August, whereas a reciprocal combination, plum/peach, remained healthy. Within 2 weeks leaves and scion bark of the incompatible combination contained several times the concentration of starch found in comparable tissues of peach/peach trees. The level of polyols were similar in the peach scions of both combinations until end of summer. In the plum rootstock starch in the bark of the incompatible trees reached a maximum concentration at the beginning of August but was essentially depleted within the next 3 weeks, while the level of sorbitol decreased by half. In relation to compatible combinations, free sugars increased in the bark above the incompatible union and declined below. Presumably, failure of the phloem to function across the peach/plum union in mid-summer resulted in the markedly dissimilar carbohydrate levels in the graft components.

449. Breen, Patrick J. 1974. Cyanogenic glycosides and graft incompatibility between peach and plum. J. Amer. Soc. Hort. Sci. 99(5):412-415.---Peach (Prunus persica Batsch. 'Lovell') seedlings and 'Marianna 2624' plum (P. cerasifera Ehrh. x P. munsoniana Wight & Hedr.?) cuttings were budded with 'Fay Elberta' peach and 'Marianna 2624'. Of the 4 combinations only 'Fay Elberta'/'Marianna 2624' showed foliar symptoms indicative of graft incompatibility; those trees budded in mid-March appeared abnormal by early August. Prunasin, the only cyanogenic glycoside detected in both species, accumulated in young scion bark of 'Marianna 2624' and peach to nearly equal levels. Amounts of prunasin in leaves and bark of 'Fay Elberta' on peach were usually greater than in those on plum. The level in the scion bark of 'Marianna 2624' was similar on both rootstocks. In late summer, the quantity of the glucoside in peach scion bark rose above that in corresponding plum bark; however, the prunasin concentration in both leaves and scion bark of 'Fay Elberta'/'Marianna 2624' trees was not correlated with the severity of incompatibility symptoms. The prunasin level in the plum rootstock bark immediately below or 18 cm from the union was unaffected by the scion species or by signs of ill-health in the peach top. Although the rootstock was shown capable of affecting the accumulation of prunasin in scion tissues, the stability of the level of this glucoside in the peach/plum combination suggests that cyanogenesis is not closely linked with their incompatibility.

450. Breen, Patrick J. and Tom Mureoka. 1974. Effect of leaves on carbohydrate content and movement of ^{14}C-assimilate in plum cuttings. J. Amer. Soc. Hort. Sci. 99(4):326-332.---The top leaf of fresh softwood cuttings of 'Marianna 2624' plum (Prunus cerasifera x Prunus munsoniana) was exposed to $^{14}CO_2$ and the effect of leaf area and indolebutyric acid (IBA) on rooting and distribution of ^{14}C was assessed. IBA enhanced the rooting of cuttings with 1/2 or 3 leaves, whereas leafless cuttings failed to root regardless of treatment. Most of the ^{14}C remained in the upper portion of the stem adjacent to the treated leaf; the mid-stem segment acquired about 40% of the activity. Little radioactivity

reached the base of fresh cuttings, but upon rooting it accumulated 4 times the percentage of ^{14}C found in comparable non-rooting bases. In all cuttings the incorporation of ^{14}C into starch was much greater in the mid-stem than in the base. As much as 75% of the radioactivity in rooted bases was recovered in a residue remaining after ethanol soluble substances and starch were removed. The level of starch declined continually in the base but decreased in the mid-stem only at the end of the study. The concentration of sugars in both segments was relatively constant while that of sorbitol declined markedly and was hardly detectable in rooted bases. The largest loss of carbohydrates occurred in the bases treated with IBA. The similarity in levels and trends of carbohydrate utilization in the bases of cuttings with or without leaves indicated that in this cultivar the stimulatory effect of leaves on rooting is not associated with their being a source of carbohydrates.

451.Ryugo, Kay and Patrick J. Breen. 1974. Indoleacetic acid metabolism in cuttings of plum (Prunus cerasifera x P. munsoniana cv. Marianna 2624). J. Amer. Soc. Hort. Sci. 99(3):247-251.---Treatment of 'Marianna 2624' plum cuttings for 7 days with 1-^{14}C-IAA with or without a pretreatment with 4000 ppm indolebutyric acid (IBA) for 5 sec revealed that the synthetic hormone inhibited IAA oxidase activity as measured by the decreased rate of $^{14}CO_2$ evolution. KOH hydrolysis of different radioactive zones on paper chromatograms derived from alcoholic extractives of cuttings yielded presumptive IAA upon re-chromatography. Likewise, KOH and peptidase treatment of the alcohol insoluble residue yielded a radioactive substance with chromatographic properties characteristic of IAA. The presence of presumptive IAA and ninhydrin-positive substances in the peptidase hydrolyzate indicate that IAA was bound to protein(s). Appreciable radioactivity still remained in the alcohol insoluble residue after protein hydrolysis.

452.Lombard, Porter B. 1973. Research's role in future pear pollination management. Ann. Rept. BCFGA Hort. Conf. 5:75-78.---Research of the pollination requirement of a pear variety should evaluate three determinates of fruit set: (1) female fertility level, based on fruit set after hand cross pollination; (2) natural pollen transfer based on fruit set of the open pollinated bloom and on the number of compatible pollen tubes in the style; and (3) effective pollination period (EPP) based on fruit set level during a period of controlled pollination.

453.Lombard, P. B. and R. R. Williams. 1974. The hard side of cider. HortSci. 9(5):420-424.---Description of cider and perry (pear cider) production in Europe. Modern orchard management in England is discussed with a description of the categories of cider and perry varieties based on fruit characteristics. Processing methods are described from milling and pressing to the final drink product.

454.Lombard, Porter B. and Melvin N. Westwood. 1975. Pear rootstock research in Oregon. Fruit Var. J. 29(1):17-19.---The history of pear rootstock of Oregon is traced from F. C. Reimer's search in the 1910, 1920 and 1930's for fire blight resistance to recent rootstock work in the 1960 and 1970's by M. N. Westwood and P. B. Lombard searching (1) for pear decline and fire blight resistance, (2) to withstand heavy clay soils, (3) to provide high yield efficiency, (4) for tree size control, (5) to provide a high fruit quality and (6) to provide a range of nutritional levels. Pear rootstocks are categorized and compared for these factors from rootstock plots in Oregon.

455.Lombard, P. B., A. Richardson, L. Anderson and R. Griffen. 1975. Bloom delay research in the Northwest - a possible solution to frost injury. Ann. Rpt. Ore. Hort. Soc. 66:137-152.---Richardson describes the chill unit model used for determining when to begin cooling of apple, apricot, cherry, peach, pear and prune trees for delay of bloom. Growing degree hours are described for peach and apple and the effect of sprinkling for cooling on the delay of bud development of apple is illustrated. Apple bloom was delayed 14 days in Utah by overhead sprinklers at 50°F and above on an intermittent basis of 2 minutes. Sprinklers consumed 45.63 inches of water from April 4 to May 21. Apples harvested on September 20 from sprinkled and non-sprinkled plots were comparable in size and color, but fruit maturity was delayed 7 days. Bloom delay research in Oregon showed that Ethephon sprayed during post harvest delayed cherry bloom 4-7 days and prunes 2-3 weeks the following spring, but with considerable injury. SADH sprayed during post harvest was most effective in delaying pear bloom but only 4 1/2 days. Sprinklers delayed apples 2 weeks in Hood River but only 5 days on pears in Medford. Misting delayed pear bloom 14 days but fruit sizes at harvest were greatly reduced in Medford.

456.Proebsting, E. L., P. B. Lombard, C. J. Weiser et al. 1975. A regional analysis of injury to deciduous fruit trees by the freeze of December, 1972. College of Agr. Res. Center, Wash. St. Univ., Bul. 813, 11 pp.---An early winter freeze struck the Northwest in early December, 1972. Temperatures ranging from 0 to -27 F were reported from the fruit districts of the region. Because the temperatures were so low and the timing so early, we expected disastrous results, especially in Idaho. When we began to look at browning of tissues, our concern shifted to the Willamette Valley, where severely browned tissue was reported. Very little crop loss or tree injury was ultimately found in the Medford, Willamette Valley, Yakima Valley or Wenatchee areas. Hood River lost some Newtown apples and Bosc pears, varieties not common to the other areas. The Dalles lost many cherry trees that had been weakened by age, internal wood rots or San Jose scale, but still picked a record cherry crop. Tree losses continued through 1974. Milton-Freewater had reduced cherry and prune crops at temperatures milder than those causing equivalent injury elsewhere. The explanation may lie in unsubstantiated reports of rapid temperature fluctuation. Temperatures were coldest in Idaho and the most severe injury occurred there, mostly to stone fruits. The survival of apples in Idaho was noteworthy. It is probable that this as well as generally good survival throughout the region in comparison with other early winter freezes was a result of nearly a week of continual subfreezing temperatures that induced strong Stage III hardening. Early diagnosis of injury and prognosis of orchard performance is still too subjective and often emotional. Improvements in this area could be made with standardized descriptions of tissue browning that could be related to expected subsequent performance. Systematic sampling procedures are necessary for objective evaluation. Such procedures should be developed for future use in the region.

457. Stebbins, R. L. and M. H. Chaplin. 1975. Fruit set research. Proc. Ore. Hort. Soc. 66:24-25.---A progress report on fruit set research in Italian prune. Fall-applied boron sprays increased fruit set the following spring by about 100%.

458. Stebbins, Robert L. 1974. The December 1972 freeze and its effects on stone fruit orchards. Proc. Ore. Hort. Soc. 65:104-108.---Describes damage to stone fruit trees by region within Oregon which occurred as a result of the December 1972 freeze. Suggestions are given for reduction of damage in the future.

459. Richardson, Daryl, Dale Kirk and Robert Cain. 1975. Brining cherries mechanical harvesting experiments. 1974 edition. Proc. Ore. Hort. Soc. 66:18-22.---The purpose of this project is to identify factors relating to damage of mechanically harvested 'Royal Ann' cherries for brining purposes. Twenty orchards were selected among grower-cooperators to study tree factors, climate, fruit maturity, and harvest equipment variables to establish optimum quality in stem-on, undamaged cherries. Computer analysis of the 120 trees in the 20 orchards from this study has indicated a very dominant role of fruit maturity, especially as identified by the stem-fruit removal force. Although percent soluble solids by refractometer has been used to predict optimum maturity, stem pull force has emerged as a much more accurate estimator of optimum maturity. Damage was low in 1974, about 5% in our study which correlated with that found in industry. Fruit removal by the harvesters averaged 87% in our study with many achieving 99%. The following pull forces can be used to predict approximate stem counts:

1340	grams	=	90% stems
980	"	=	70% "
625	"	=	50% "
265	"	=	30% "

Tests are continuing in 1975 expanding the study to 12 trees per orchard instead of 6. Generally, there was more damage to fruit harvested at later maturities in addition to loss of stem counts. Despite the low damage observed and the difficulty in relating machine factors to it, these are assumed to be important and may become more evident in future studies.

460. Westwood, M. N. 1974. Winter freeze - one year later. Amer. Fruit Grower 94(1):12A.---Temperatures on December 8, 1972 in Western Oregon were down to about -15°F in some locations. With 7 inches of snow on the ground, the temperature just above the snow was much colder than in the weather shelter. Severe injury was sustained on most young orchards and on all ages of walnuts. Blackberry and black raspberry canes were killed to the snow line. Red raspberries, cranberries and strawberries showed little injury. Considerable injury to stems of pear, filbert, apple, blueberry, and peach was apparent, but many of them made good recovery during 1973.

461. Westwood, M. N. 1974. Performance of prune rootstocks. Proc. Ore. Hort. Soc. 65:93-95.---The following points can be made with respect to rootstocks for Italian prune: 1. Marianna 4001 is more efficient in nutrient uptake and in yield efficiency than is peach. Marianna 4001 will be available soon to Oregon nurseries. Its outstanding performance in a wide variety of conditions warrants its use in commercial orchards. 2. Of the available stocks, Marianna 2624 is somewhat smaller than peach, while Marianna 4001 and myrobalan 29-C are larger. 3. Myrobalan, Marianna, and St. Julien A stocks are not only more drought tolerant than peach, but they also are better in wet soils where peach may suffer root mortality. 4. Careful planning of site, rootstock and spacing will provide maximum bearing surface early, with an option to remove fillers as the trees mature. 5. Varieties other than Italian types might show different rootstock preferences. In our tests, Brooks performed better on myrobalan 5Q and on peach than on any other stocks.

462. Westwood, M. N. 1974. High density pear plantings. Proc. Ore. Hort. Soc. 65:73.---High densities require a good balance of practices, plus the following factors: 1. Spacing and rootstock must go together. 2. Use virus-free planting stock. 3. Row spacing should not be determined by the size of existing equipment. 4. Dwarf trees should be supported on a trellis. 5. Keep graft unions above ground to avoid scion rooting. 6. Old Home is a better interstem for Quince than Hardy. 7. Use Quince root in clay soils, but use OH x F 51 in colder regions. 8. Heading-back pruning is best on mature hedgerows.

463. Westwood, M. N. 1974. Density produces fruitful harvest. Ore. Agr. Prog. 21(1):6-7.---High density orchards produce up to 5 times as much fruit as conventional low density plantings when full dwarf trees are trained to trellis wire supports. Intensive culture of small trees results in more efficient labor for pruning, thinning, and harvesting. Yield can be 50 tons per acre rather than the 10 tons which commercial growers average.

464. Varseveld, George W., M. N. Westwood and R. L. Stebbins. 1974. Field and processing studies of 'Primegold' apple. Fruit Var. J. 28(2):32-34. ---Based upon the evaluation data reported here, the 'Primegold' apple is severely limited in its potential for processing. The rapid discoloration of the flesh, which occurs during heating or exposure to air, indicates the presence of a highly active phenol-oxidase enzyme system in this apple. Above average firmness makes 'Primegold' more useful for sliced pack than for sauce if discoloration can be controlled. From the standpoint of overall growth, fruiting, production and processing, 'Primegold' is much less desirable than 'Golden Delicious' in productivity, mildew resistance, fruit shape, mealiness, scald, core breakdown, eating quality, and processed quality. It is better than 'Golden Delicious' only in firmness and in smoothness of finish.

465. Young, M. J. and M. N. Westwood. 1975. Influence of wounding and chilling on rooting of pear cuttings. HortSci. 10(4):399-400.---Disbudded 'Old Home' x 'Farmingdale' (OH x F) pear (*Pyrus communis* L.) cuttings rooted

96% before sufficient chilling to break rest and 84% after chilling. Rooting mass (as rated on a scale of 0 to 3) for disbudded cuttings was also less for chilled (1.22) than for nonchilled (1.94) cuttings. Disbudding of chilled cuttings reduced rooting significantly. Internodal wounding failed to alter % rooting but reduced rooting masses for both nonchilled and chilled cuttings, relative to non-wounded controls. The rooting mass of nodally wounded chilled cuttings was suppressed even further.

466. Axford, M. A., M. N. Westwood and M. H. Chaplin. 1975. Effects of scion and rootstock on mineral nutrient content of leaves of both scions and rootstocks of sweet cherry. HortSci. 10(3):234-235.---The nutrient content of rootstock and scion leaves from trees of 'Napoleon' and 'Corum' sweet cherry (Prunus avium L.) growing on Stockton Morello (Prunus cerasus L.) and East Malling Mazzard F12-1 (Prunus avium L.) was analyzed. The concentration of Ca was greater in 'Corum' on F12-1 than on Stockton Morello. Rootstocks interacted with scions for K, P, Mg, Fe, Cu, B and Zn.

467. Westwood, M. N. 1974. Limiting factors in world food supply and distribution. J. Amer. Scientific Affiliation 26(3):115-118.---Improper distribution of food is the cause of hunger in the world. Food production can be increased to meet world needs but is controlled more by cash demand than human need. Poor people are hungry because they have no money to buy food rather than because there is not enough food. Lack of a minimal education is the usual cause of poverty, so removing that limitation would shift purchasing power, which in turn would cause shifts in food production and distribution. Food production potential far exceeds the need in the foreseeable future, even assuming a continued increase in population. Man's increasing dominion over the earth makes him more responsible for the proper use and conservation of its resources, if he is to pass on to his children a livable planet.

468. Westwood, M. N. and H. O. Bjornstad. 1974. Fruit set as related to girdling, early cluster thinning and pruning of 'Anjou' and 'Comice' pear. HortSci. 9(4):342-344.---Tests with pear on P. communis L. and 'E. M. Quince C' (Cydonia oblonga Mill.) rootstocks showed that early fruit thinning to 1 fruit per cluster increased ultimate % fruit set of 'Comice'; thinning to 2 fruits per cluster did not increase ultimate set. Limb girdling 3 weeks after bloom did not effectively increase set, but when used in combination with cluster thinning, increased 'Anjou' set beyond either treatment alone. Heading-back pruning of 'Comice' on 'Quince C' in a high density plot increased both fruit set and ultimate yield relative to thinning-out pruning.

469. Westwood, M. N. and H. R. Cameron. 1974. Effects of vein yellows virus on growth, flowering and yield of Anjou pear. J. Amer. Soc. Hort. Sci. 99(5):425-426.---Growth and performance of 'Anjou' pear, Pyrus communis L., were reduced by infection with severe vein yellows virus (VYV) tested in 2 plots for 10 years. Bloom density and yield with some selections

were reduced by the virus. Overall performance was affected by scion source as well as by VYV content. Inconsistencies resulted apparently from either undetected viruses, different strains of VYV, or from differences in genetic strains of the pear cultivar.

470.Zwet, T. van der, W. A. Oitto and M. N. Westwood. 1974. Variability in degree of fire blight resistance within and between Pyrus species, interspecific hybrids, and seedling progenies. Euphytica 23:295-304.---One hundred seven selections from 17 species, 85 selections from controlled interspecific crosses, and a large number of species hybrids of pears were tested for resistance to fire blight (Erwinia amylovora (Burr.) Winsl. et al.). The degree of resistance varied between species and between the clones and selections within species. In species hybrids, resistance varied between selections. Because of this variability, a fixed resistance rating could not be assigned to any given species. In interspecific crosses, resistance was not consistently transmitted either by crossing a highly resistant with a very susceptible species or by crossing two highly resistant species. The highest degree of overall resistance resulted from crossing two moderately resistant parents. Therefore, a given clone of a species should be tested for its individual degree of resistance before it can be used profitably in a breeding program.

471.Chaplin, M. H. and A. R. Dixon. 1974. A method for analysis of plant tissue by direct reading spark emission spectroscopy. Applied Spectroscopy 28(1):5-8.---A procedure was developed for the rapid quantitative determination of K, P, Ca, Mg, Mn, Fe, Cu, B, and Zn content in plant tissue by direct reading emission spectrometry using spark excitation and the rotating disc electrode technique. Aliquots of standard reference material, ground to pass a 40 mesh screen, are weighed into high form porcelain crucibles and ashed at 450°C for 6 h. Five milliliters of an internal standard-buffer solution (0.2% cobalt and 0.5% lithium in 1 *N* HCl) are added to the remaining ash. The resulting solution is subjected to a 30-sec burn on the spectrometer, and the intensity ratios for each element are recorded. Known concentrations (X) and intensity ratio units (Y) are entered into a stepwise regression computer program, and the linear, quadratic, and cubic regressions of Y on X are determined. Sample values are entered as Y into the appropriate regression equation which is then solved for X. If quadratic or cubic regression equations are used, the program will select the appropriate root. Relative standard deviations for samples determined over a several-day period generally were less than 10%.

472.Chaplin, Michael H. 1973. Leaf analysis and fertilizer suggestions for apple and pear. Proc. Ore. Hort. Soc. 64:47-50.---Leaf analysis has been used for the past ten years in Oregon as a diagnostic tool to determine nutrient need for apple and pear trees. The most obvious use of leaf analysis would be to confirm deficiencies observed in the field. The most useful value of leaf analysis is the detection of hidden hunger or below normal leaf element levels before the more serious condition of visible deficiency occurs. The basic concept of leaf analysis can be summarized as follows: leaf element content is an index of the nutritional status of the tree, irrespective of the nutrient supply in the soil. In general, environmental factors including soil type differences do not significantly affect potential performance without also affecting leaf composition. The relationship between leaf element content can be expressed as a series of ranges, i.e., shortage, below normal, normal, and above normal. These ranges will hold in the location in which they were developed for subsequent years and in general for other locations. The O.S.U. diagnostic program is discussed.

473.Wang, C. Y. and W. M. Mellenthin. 1974. Inhibition of friction discoloration on 'd'Anjou' pears by 2-mercaptobenzothiazole. HortSci. 9(3):196.---Treatment with 2-mercaptobenzothiazole (MBT) inhibited the friction discoloration of fruit of 'd'Anjou' pear (Pyrus communis L.). The inhibition was apparently due to inactivation of the pear polyphenoloxidase.

474.Crabtree, Garvin and Robert L. Stebbins. 1974. 1974 Oregon weed control recommendations for commercial orchards. Ore. State Univ. Ext. Circ. 745, 3 pp.---Adequate weed control is necessary to obtain maximum development of new plantings of trees and to conserve moisture in nonirrigated orchards. The first line of defense against weeds is the use of good cultural practices. Cultivation is often the most efficient method of removing weeds, but orchards can be severely damaged by cultivating too deeply and too close to the trees. Herbicides provide a valuable tool to help control weeds in orchards. Improper use of herbicides can result in tree injury; proper use can reduce labor costs and improve weed control. Annual weeds are killed most easily when conditions favor germination and rapid plant growth. Control of perennial weeds by herbicides active through the soil is best if the herbicide is applied at a time when rainfall or irrigation will move the herbicide into the root zone of the weeds just before they start active growth. Soil characteristics, such as clay content and organic-matter level, strongly influence the effect of some herbicides. It is necessary to apply the correct amount of herbicide uniformly over the control area. A table is given for herbicide uses in orchards.

475.Mellenthin, W. M. 1975. D'Anjou pears for late storage - how growers can help. Proc. Wash. State Hort. Assoc. 71:132-133.---The association of cultural practices to general orchard vigor and the relationships to the keepability of winter pears are discussed. Also the influence of seasonal climatic conditions on maturity are reviewed.

476.Wang, C. Y. and W. M. Mellenthin. 1975. CO_2 for better storage of d'Anjou pears. Proc. Wash. State Hort. Assoc. 71:135-138.---The use of high concentrations of carbon dioxide (12%) for 2 weeks immediately following harvest has prolonged storage life and improved the capacity to ripen uniformly without CO_2 injury. Factors which influence the susceptibility to CO_2 injury are discussed.