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FRUIT RESEARCH LABORATORY
Wenatchee, Washington

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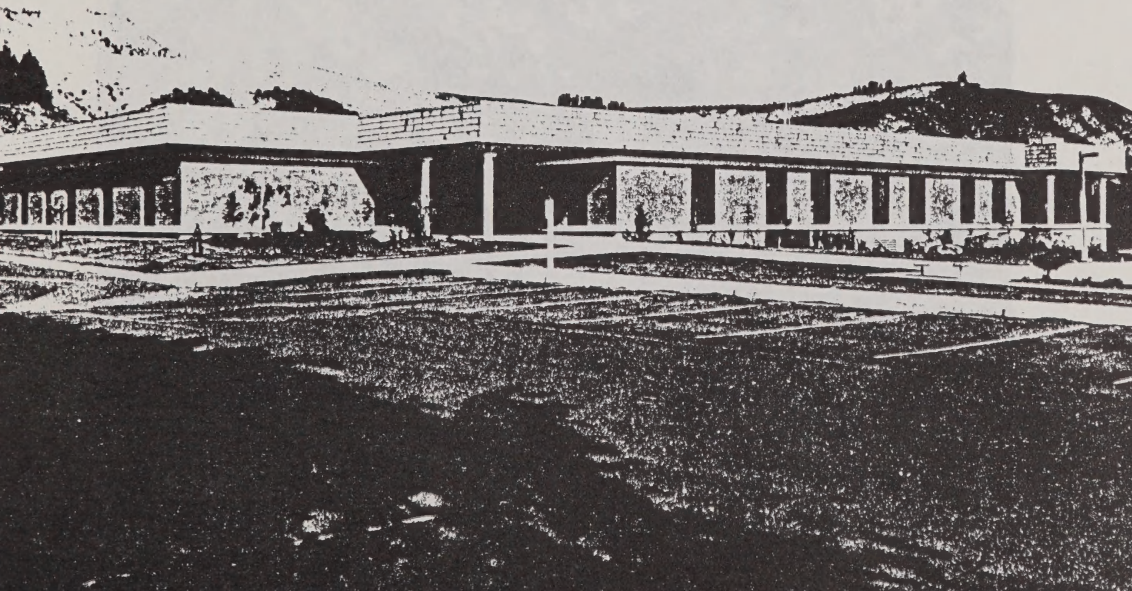
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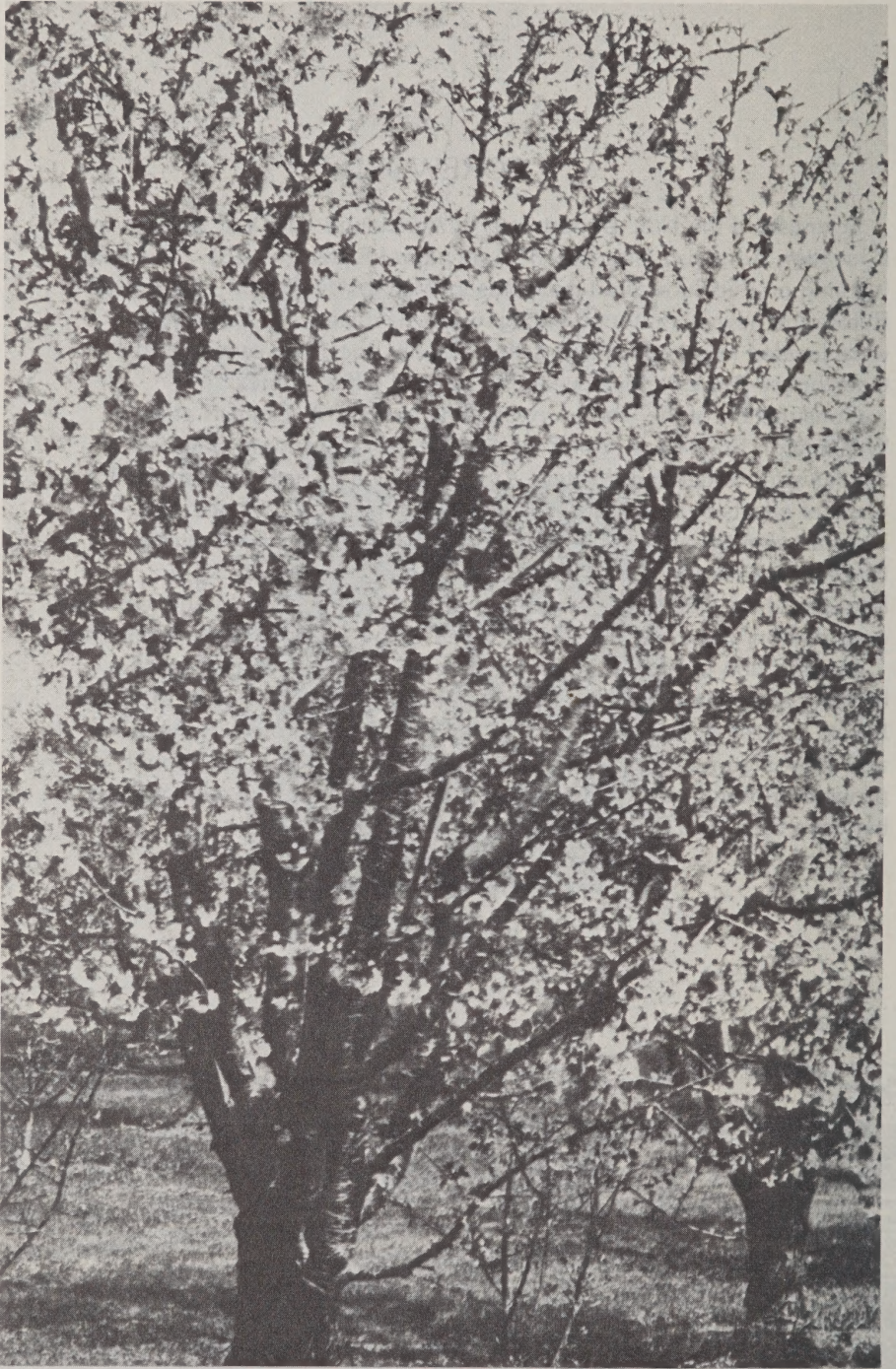
FOREWORD

Scientists of the U.S. Department of Agriculture (USDA), Science and Education Administration (SEA), Agricultural Research (AR), have been working on deciduous fruit problems in Wenatchee, Wash., since 1913. Before the new laboratory building was constructed, the laboratories were located in several places within the city, including several in the Courthouse Annex and 40 years in the Post Office Annex.

Construction of the laboratory building for USDA scientists at the Washington State Tree Fruit Research Center, near the intersection of Springwater Street and Western Avenue in Wenatchee, culminated 15 years of efforts by fruit industry leaders to bring together State and Federal scientists at a single location. Cooperative efforts involving the USDA, Washington State University, and the Washington State Legislature resulted in the sale of bonds by the University to finance construction of the building, which is leased by the Federal Government.

The location of SEA and National Weather Service employees in a building adjacent to the Fred Overly Laboratories, and close to the U.S. Forest Hydrology Laboratory, U.S. Environmental Protective Agency, and Washington State Pesticides and Chemical Laboratories should provide opportunities to improve already fine cooperative relationships between State and Federal scientists.





MISSION

The mission of the U.S. Department of Agriculture, Science and Education Administration, Agricultural Research, in Wenatchee is to help reduce production costs, improve handling methods, and deliver the best quality fruit to the consumer by studying the producing, harvesting, handling, storing, and transporting of deciduous fruits grown in the Pacific Northwest.

MAJOR ACCOMPLISHMENTS

Production Research

Investigations on horticultural problems associated with fruit production have been a major part of the research program at the Fruit Research Laboratory. The following practical applications of research results have had an important effect on the fruit industry and, ultimately, the consumer:

- Blossom thinning with chemicals has reduced production costs, helped to maintain annual bearing of fruit trees, and improved fruit size and quality.
- Use of growth regulators to hasten or delay fruit maturation has extended the period during which high-quality fruit can be harvested.
- Development of methods for predicting fruit size at harvest has permitted packers to order, *in advance*, the packing materials needed for a given crop.
- Tree training methods and the use of growth regulators have enabled growers to get early fruit production from young trees in high-density plantings.
- Development of mechanical harvesting aids and bulk bins for harvesting and storing fruit has reduced harvesting and handling costs and reduced bruising.
- Studies on virus diseases of fruit trees and the development of methods for eradicating viruses from tree tissues have resulted in the production of virus-free nursery stocks.

Postharvest Research

Research on problems associated with postharvest handling of fruit is another important part of our program. Our accomplishments in this area include:

- Development of maturity standards for determining the proper time to harvest fruit that will be high in quality even after several months in storage.
- Determination of refrigeration requirements for cooling, storing, and transporting fruit to market to extend storage life and deliver quality fruit to the consumer.
- Development of polyethylene film box liners, high carbon dioxide treatments, and controlled atmosphere storage to extend the storage life of apples, pears, and cherries.
- Chemical treatments to control scald and postharvest rots, which permit practical storage of apples for as long as 11 months.
- Color sorting of fruit electronically has produced greater uniformity of color within individual packages. This technique may eventually help eliminate fruit with internal blemishes.
- Studies on packing materials, containers, and stacking patterns have provided better cooling in storage and transit and greater protection for fruit in transit, storage, and at the retail level.
- Engineering and economic studies in the packinghouse have resulted in changes in equipment and packinghouse layout that have increased efficiency and reduced bruising of fruit during packing.

CURRENT RESEARCH

The research staff consists of plant physiologists, plant pathologists, agricultural and industrial engineers, agricultural economists, and technicians. The complex nature of some research problems often requires the cooperation of two or more scientists from different disciplines. With this staff, we can study fruit from pollination to consumer.

Production Research

Considerable effort is devoted to studies on the effect of growth regulators on trees and on fruit. Chemical tests are being made to offset biennial bearing and to advance or retard fruit maturation, permitting

Harvesting apples by hand.



Depositing apples in bin.



Spray rig for blossom thinning.



longer periods during which quality fruit can be harvested, thereby lengthening storage. Fruit loosening agents are being tested to aid in harvesting and handling sweet cherries. Studies are also under way to identify naturally occurring regulators and to determine their role in fruit set of apples and pears. Related studies are being made to determine whether synthetic materials act alone or by stimulating naturally occurring regulators. The effect of temperature, growth regulators, and mineral nutrition on the concentration of carbohydrates associated with cold hardiness is being investigated.

Nutritional studies are being made to determine the role of the efficient use of nitrogen on the color of leaves and fruit in Golden Delicious apples and on the role of calcium in the development of alfalfa greening in Anjou pears.

Mechanical harvesting of apples and pears continues to occupy the engineers who are designing fruit harvesting and handling equipment. Attention is also being given to the development of orchard systems and tree shapes that will facilitate mechanical harvesting. Comparisons are being made on the costs of mechanical and manual harvesting and on the effect of harvest methods on fruit quality.

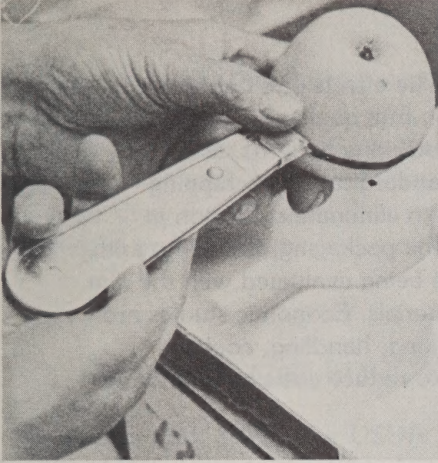
Work on virus and viruslike diseases is continuing. The degree of spread of little cherry disease is being determined in commercial orchards in the State of Washington. Tests are continuing to determine the possible role of viruses in dead-spur disease of Red Delicious apples.

Postharvest Research

Studies are being conducted to determine the effects of mineral nutrition and environmental factors on maturity of apples. Refinements are being made on methods for determining optimum maturity for fruit harvest. Work continues on electronic sorting of fruit for internal and external color and for internal blemishes, with attention being given to the development of electronic sorting equipment for large-scale operations in packinghouses. Testing is in progress on modified atmosphere treatments, including relatively short periods of exposure to high concentrations of carbon dioxide or low levels of oxygen. Research on postharvest disease control is being directed toward nonchemical or low-level chemical treatments to comply with increasingly tight regulations on water disposal. The tighter regulations notwithstanding, new chemicals are being tested for disease control as they become available.

Engineering research is being directed toward developing greater efficiency in the packinghouse and modifying equipment to minimize bruising during packing. Methods for maintaining temperatures and

Determining sizes of apples.

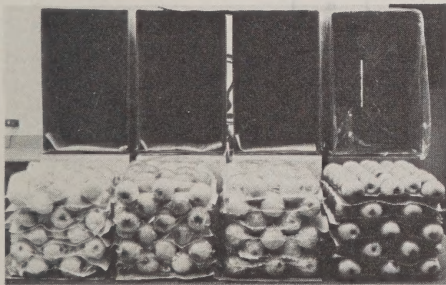


Pressure testing apples.



Preparing fruit samples for experiments.

Measuring fruit color electronically.

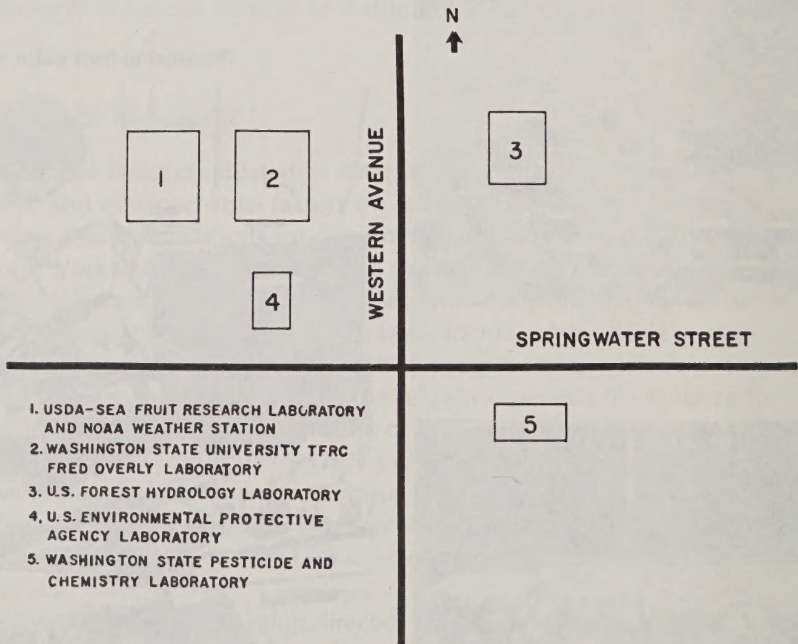


Experimental apple packages.

modified atmospheres are being sought. The effects of different containers and modes of transportation on fruit quality are being studied with the aim of designing new packages, stacking patterns, and refrigerated transportation equipment. Standardization of shipping containers and conversion to metric units to eliminate confusion in international markets are being studied. The packaging, handling, and transporting of fruit to foreign markets are being evaluated with the aim of developing improved methods and materials. Economic studies are being made to determine the costs of packing, handling, cooling, storing, transporting, and marketing fruit to reduce costs by improving efficiency in these operations.

FACILITIES

The laboratory building provides offices, a library, photography darkroom, conference space, and rooms for drafting, sample preparation, bioassay, chemical extraction, and growing plants under artificial light. Ten individually controlled cold storage rooms adjoin the fruit handling room and the electronics laboratory. Eight laboratories, each designed to



Research facilities in vicinity of Fruit Research Laboratory.

fit the requirements of individual scientists, round out SEA's portion of the ground floor.

Additional facilities house the engineering shops and fruit handling equipment. Orchard experiments are conducted at the research center, Columbia View Experimental Plots near Orondo, Wash., and in commercial orchards in the fruit-growing areas of the State.

SCIENCE AND EDUCATION ADMINISTRATION

On January 24, 1978, four USDA agencies—Agricultural Research Service (ARS), Cooperative State Research Service (CSRS), Extension Service (ES), and the National Agricultural Library (NAL)—merged to become a new organization, the Science and Education Administration, U.S. Department of Agriculture.

SEA is the largest agency of its kind in the world, and Agricultural Research (AR) is its major research arm. The primary mission of SEA-AR is to help in meeting the food and fiber needs of our nation and of the world by providing an aggressive research program with maximum responsiveness to agricultural problems.

SEA-AR works in close cooperation with State experiment stations, State departments of agriculture, other government agencies, public organizations, farmers, ranchers, and industry.

The Agency's research is conducted at more than 150 laboratories, field stations, and work sites in 46 States, the District of Columbia, Puerto Rico, the Virgin Islands, and nine foreign countries. In the United States, SEA-AR facilities are located in four locally administered geographic regions. Twelve Western States comprise the Western Region, which is headquartered in Oakland, Calif.



VISITORS AND INFORMATION

Visitors are welcome at the Fruit Research Laboratory. Tours should be arranged as far in advance as possible by contacting:

**Research Leader, USDA-SEA-AR
Fruit Research Laboratory
1104 North Western Avenue
Wenatchee, Washington 98801
Telephone: 509/662-4317**

Any questions regarding agricultural research at this facility may be directed to the above address. Questions about SEA-AR research elsewhere in the Western Region, or anywhere throughout the Agency, may be directed by mail or phone to:

**Area Director, USDA-SEA-AR
Washington-Oregon Area
Room 221, Agricultural Sciences Bldg., Phase II
Washington State University
Pullman, Washington 99164
Telephone: 509/335-6631**