egon's Agricultural

Progress

Fall, 1975 Oregon State University, Corvallis

A matter of pride-- and family

Interpreting and applying the results of research are sometimes very tricky—the rewards can be great, the mistakes can be disastrous or you can waste a lot of money. This is why most researchers in agriculture are cautious with their recommendations and often hedge in their comments by including many conditions that sometimes seem too conservative.

The September 14 issue of The Sunday Oregonian included an editorial, "Manure Victory," which dealt with the values of organic farming. One of the statements in the editorial was: "Many farmers are interested in organic methods, but they find little technical help from the USDA or their state-supported colleges and universities. Too long, these institutions have been prisoners of the giant chemical companies that pass out research grants."

I mention this because the editorial writer incorrectly interpreted the results of a research project conducted by the Center for the Biology of Natural Systems of Washington University in St. Louis. The study was a comparison of the production, economic returns and energy intensiveness of corn belt farms that do and do not use inorganic fertilizers and pesticides.

The editorial writer accepted without proper questioning the conclusion of the study that the returns per acre between organic and conventional farms were about equal. If the comparison is made on a whole-farm basis, one finds that the harvested acres on organically farmed cropland were much less than the cropland harvested within the conventional farm (266 vs. 358). Total production per farm was, therefore, about 30 percent higher for the conventional farm than for the organic farm. In addition, the extra charge made for phosphorus and potassium for conventional farms should have been made also for organic farms because unless supplemented by off-farm sources of phosphorus and potassium, organically farmed soils will gradually be depleted of these important elements.

The Agricultural Experiment Station and Extension Service have encouraged the use of organic materials in farming since the Station was started in 1888. Use of green manure crops, manures and other similar practices has been widely adopted to improve soil structure, root growth, water penetration and erosion control, among other things.

We therefore believe the editorial writer was unfair when he said that the Agricultural Experiment Stations were prisoners of the chemical industries—just because he did not examine the report completely and interpret the results properly. That is like saying that your family doctor is a prisoner of the pharmaceutical industry because he prescribed aspirin for your cold.

In contrast to many other fields, agricultural research is very close to most Oregonians. This is the way it should be and we are proud of this close relationship; the personnel at Branch Experiment Stations and in the Extension Service, in addition to those on campus, constantly strive to present logical and useful up-to-date information.

Our style of research and delivery of information means that people in Oregon are aware of what we are doing and can often apply the results of research before all conditions or limitations are fully explored. Again, we would not trade this highly responsive system for any other system.

The point of all this is that we conduct research that is pertinent to the needs of the agricultural industry and the consumer, and that we present the results of the research in a completely honest and applicable manner. We intend to maintain this credibility with you and with all Oregonians. This is the reason for *Oregon's Agricultural Progress*, our quarterly publication: to keep you informed and to assist in the development of a better life for Oregonians.

What you find herein may be just an idea or it may have many conditions attached—but you can count on it.

John R. Davis
Director

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Thank You, Mr. Ford

The following letter from President Gerald R. Ford congratulates State Agricultural Experiment Stations on their first century of service. R. L. Lovvorn, administrator of the Cooperative State Research Service of the U.S. Department of Agriculture in Washington, D.C. said such letters from the White House are rare, so it is our pleasure to pass the President's message on to you.

November 7, 1975

As part of the vast public research team of the United States Department of Agriculture and the Land Grant Universities, scientists at our State Experiment Stations have been responsible for developing more machinery, improved varieties and hybrids of crops and better farming and ranching practices that have led to dramatic increases in both yields and efficiency of livestock and poultry production.

As these State Experiment Stations mark the one hundredth anniversary of their important service to our society, it is most appropriate that we pay tribute to their accomplishments.

Beneficiaries of their research extend far beyond the agricultural industry. United States consumers have gained through the development of a food system that is the envy of the world. Societies everywhere have profited from the discoveries of such things as Vitamin A, streptomycin, aureomycin, dicumarol and the significance of amino acids to human diets. As a result of this work, we are no longer plagued with such afflictions as rickets, goiter, pellegra and scurvy. And we have useful treatments for tuberculosis and other diseases. A recent discovery of viroids is leading to studies of disorders in plants, animals and humans that have virus-like symptoms, but so far no apparent virus cause. The early climatic studies conducted in dairying by State Experiment Station scientists helped pave the way for our manned space ventures.

The founding of the first State Experiment Station in New Haven, Connecticut, in 1875 was rapidly followed by the establishment of a second station in California. Today, every state has a station, and many have two. They represent an important network of critical research in climate, soil, moisture, terrain and other conditions crucial to successful agriculture. Millions of students at the Land Grant Universities have obtained a basic foundation for their studies through the research conducted at these stations. And that foundation has extended throughout all the basic sciences.

American agriculture has developed from the point where one farmer produces food for himself and nine others to where he produces enough for himself and more than fifty others. Many agricultural scientific discoveries have enabled our farmers to achieve this level of production. The creation of hybrid corn, the development of a vaccine against Newcastle disease of poultry, the control of wheat rust and the abolishment of rust epidemics and discoveries of how to innoculate worn soils to make them more productive are but some of the many modern findings that have made agriculture more productive. The development of sophisticated farm machinery has made it possible for only five percent of our work force to produce the food and fiber we need.

As the world population and food requirements grow literally by the hour, the future task of science and education seems almost overwhelming. Fortunately, the past achievements of our joint Federal-State research system, of which the State Experiment Stations are a major part, help us to look forward to tomorrow with hope and confidence.

Gerald R. Ford

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Richard Floyd, Editor

Linda McCormick, Assistant Editor

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One source of food multiplies

Once there was a world with too many people and not enough food.

Enter the rabbit.

"Rabbits offer unique advantages in the search for world food," said OSU animal nutritionist Peter Cheeke.

"They can utilize protein in plant tissue to make protein which man can use. They can be grown in cities or hard-to-reach developing nations. They're quiet, they don't take up much space and it's easy to increase their populations. The question is whether rabbits will ever realize their full potential."

Cheeke became interested in rabbits six years ago when he was asked to formulate a nutritionally complete rabbit ration. He found very little information about the nutritional needs of the animals and decided to investigate the animals himself.

But while he was testing experimental diets, Cheeke encountered a major problem. Rabbits won't eat anything they don't like.

"We had to conduct a diet preference study because rabbits are very finicky eaters. They would rather starve to death than eat something they don't like, a fact which makes experimental work difficult when they won't consume test diets," Cheeke said.

Rabbits are herbivores, and because of that fact it has been widely assumed that they utilize fiberous food efficiently. Not so, Cheeke said.

"The digestibility of fiber in the rabbit is lower than in most other livestock, including swine. The reason why fiberous forages such as alfalfa are useful feeds for rabbits is because the animals extract protein from them," Cheeke said.

Alfalfa is one of the main feeds used by rabbit growers because it is relatively inexpensive. But Cheeke found that the rabbit digestion process confirms the use of alfalfa as a rabbit ration component for nutritional reasons as well.

"Rabbits combine digestive aspects of both ruminant animals like cattle and sheep and non-ruminant—or monogastric—animals like pigs, rats and humans," Cheeke said.

Like monogastric animals, rabbits must take in protein in the form of amino acids which are absorbed by the body in the intestines. But unlike monogastric animals, rabbits can efficiently extract protein from forages like alfalfa.

"In ruminant animals, protein from alfalfa is converted in the rumen to lower-quality bacterial protein. But rabbits can digest amino acids from forages and absorb them as they are," the Experiment Station scientist said.

A commercially produced alfalfa protein concentrate was one of the protein supplements tested by Cheeke in the rabbit preference study. On the average, the six male Dutch rabbits tested preferred the concentrate. They also chose barley as their favorite grain.

"One of the most interesting things about rabbits—and also geese—is that they obtain the same type of protein concentrate through their normal digestive process. They can consume plants and fully absorb the protein because their digestion is so efficient," Cheeke said.

For example, the digestibility of alfalfa protein in the rabbit is 75 percent, but in a pig it is only 40 percent.

That digestive efficiency means rabbits have the potential of becoming a valuable food resource in many parts of the world, especially as fuel resources needed to transport meat for man from one part of the world to another become limited.

"It makes a lot of sense to raise rabbits. Especially as the gasoline situation worsens, the necessity of growing food near where it's going to be consumed becomes more apparent. Raising rabbits leads to greater self-sufficiency in the community," Cheeke said.

The OSU scientist said some counter-establishment groups living in self-sufficient food growing communities could easily integrate rabbits into their systems. A multi-story dwelling with a rooftop garden and a trout farm in the basement could easily include rabbit pens on the first floor.

Will rabbits ever realize their full potential as a protein source for man?

Maybe not in America where consumers have a wide range of food choices and where many persons maintain a negative stigma against eating rabbit, Cheeke said.

But elsewhere in the world, where the pressing need for cheap protein already exists, rabbits are offering a positive alternative to hunger.

Rabbit breeders also growing in numbers

How large is Oregon's rabbit industry?

No one seems to know for certain, but there is evidence that the numbers of rabbit breeders may be multiplying almost as quickly as the rabbits themselves.

The first statewide rabbit raisers' seminar held in Eugene on Nov. 8 attracted more than 400 persons. The one-day program was designed to provide information on rabbit nutrition, diseases, genetics, butchering, marketing, hide tanning, finances, husbandry and other subjects.

Rabbit processing plants have been feeling the boom in production, too. Four processing plants are located in the state and growers ship still more animals outside Oregon for processing. In one month, three of the Oregon processors reported a total of 14,000 rabbit fryers sent to market.

Growing interest in rabbit raising also has swelled Oregon State University's 4-H rabbit program.

Last year, nearly 1,500 young persons between the ages of 9 and 19 enrolled in the 4-H rabbit program. In 1970, enrollment totaled only 858, and growth has steadily increased. Lane County has the largest 4-H rabbit program, followed by Clackamas, Marion and Jackson counties.

And not only are the Oregon 4-H members concerned about raising their own rabbits, they will soon be raising rabbits for Costa Rica under a three-year program sponsored by the OSU Extension Service in cooperation with the Partners of the Americas and the 4-S program, Costa Rica's equivalent to 4-H. Oregon 4-H members will provide the foundation stock for a rabbit industry in the Central American nation and furnish more than 80 breeding animals each year for the next three years.

So while numbers are uncertain, the Oregon rabbit industry seems to be hopping with growth.

Nesting ducks egged on by unmowed fields

First, a nesting spot.

Then the adult duck's problems really begin, even at a protected haven like the Malheur Wildlife Refuge. Predators await, interested both in the duck and her eggs.

The coyote, raccoon and raven are primary enemies. But there are others—including the weasel and badger. For the setting duck, dense vegetation is an ally.

The vegetation is lush on most of the Refuge, a 181,000-acre complex centered on Malheur Lake which has been an important breeding and resting area for water fowl, marsh, shore and waterbirds since prehistoric time. For many years, ranchers have mowed and used portions of the property for winter grazing, traditional use of many western refuges.

What effects do mowing and grazing have on the nesting and production rate of ducks? Little information is available on effects of cover removal on duck production in nesting areas in the west.

To find out the effects at theMalheur Refuge, John Clark, wildlife scientist, set up a study area in the Blitzen Valley of approximately 1,700 acres, divided into three nearly equal units by fences. The three units were similar in cover types, water areas and in terrain.

During the two years of the study, each unit had two different treatments. One was the traditional use of mowing the meadows in late summer and grazing them during the winter. The experimental treatment was no grazing and limited mowing of pond and flooded meadow areas in late summer. Controlled flooding was used on all units.

Six plots of 9 hectares (22.22 acres) each were randomly selected on each of the three units. Intensive nest searches were conducted with the help of Clark's assistant, Abby, a trained Hungarian pointer, to determine nest density. Portions of the entire study area also were searched for nests.

At each nest, Clark recorded location, species of duck and the number of eggs. He also measured the vegetation and distances to open water, nearest water and the distance to cover. Before hatching, the nest was marked with a stake 30 feet away so it could be found easily.

After the ducks hatched, Clark examined the nest to determine whether the nest had been a success and what had happened to it.

The primary subjects of the study—mallards, cinnamon/blue-winged teal and gadwalls—built 90 percent of the nests found. But nests of six other species also were discovered during the study.

The first year, Clark found 132 nests. In 1975, he found 201. Most undisturbed nests had 8 to 11 eggs. Hatching time was May 15 to August 10 and most ducks left their nests with their brood shortly after the last duckling hatched. Some nests had been abandoned before hatching.

Based on the density of nests on study plots, the experimentally treated areas were considerably more attractive to ducks than the units mowed and grazed in the traditional pattern.

The highest nest density and the highest vegetation density both occurred in experimentally treated units, indicating that the treatment did increase the density of vegetation and that ducks selected the units for nesting most often because of the denser vegetation available.

Using the number of ducklings hatched from nests on study plots, the experimentally treated area was more productive in two out of three cases than the traditional use.

However, Clark pointed out that there was an indication that nests in one experimentally treated area were slightly less successful than nests in the units treated traditionally in producing ducklings.

"There is some indication that the lower nest success in the experimental unit was a result of earlier nesting attempts in that unit—and earlier nesting attempts tended to be less successful than later nesting attempts."

The three units had six cover types; three were used by nesting ducks. These were brush with short grass, brush with tall grass and tall grass. In general, the tall grass had the highest vegetation density.

Clark's study showed that ducks selected the densest vegetation available for nesting and that vegetation within the units was densest in all cover types when grazing and mowing were restricted.

Finding and recording the data from a duck nest are critical processes for Experiment Station researcher John Clark, above. He measured the vegetation, distance to open water, nearest water and the distance to cover, then marked the nest so it could be easily located. Helping locate the nests was Abby, a trained Hungarian pointer, right. When the study was concluded, Abby found a new home in Albany.

Pipe dreams sprouting prosperity, problems

Five years ago, it looked like the wheel of fortune had rolled into the Northern Columbia River Basin to stay.

Circle irrigation—a new watering method employing a deep center well and irrigation pipe moving over a field in a circular pattern—transformed semi-arid regions of Morrow, Gilliam and Umatilla counties into lush farmland almost overnight.

The new irrigation method—and the subsequent growth of agriculture in the area—set off a chain reaction of growth which is now the subject of an intensive, one-year study in OSU's Department of Agricultural and Resource Economics. Coordinator of the project, which employs a total of 20 economists and Extension agents, is Fred Obermiller, an Experiment Station and Extension researcher.

"Since 1971 alone, more than 16,000 irrigated acres have been developed in the area, another 30,000 acres are in the process of being developed, and the long-range projections suggest an additional 200,000 irrigated acres may come into production in the next 10 years," Obermiller said.

But irrigated land is not the only sign of growth in the Northern Oregon counties.

Said Obermiller:

"Agribusiness and industrial growth in the area followed as a consequence of irrigation development. Eleven major firms, ranging from irrigation pipe manufacturing companies and bulk fertilizer firms through packing plants and processing enterprises have selected the area for present and future investment programs. Nuclear and coal-fire plants and an aluminum reduction facility are also considering location within the area, and businesses such as banks, restaurants and stores have been started to provide services to the growing communities."

But central to the development of agriculture, industry or business is the availability of water, and increasingly, water from the underground wells is becoming scarce. Only one alternative water supply source exists—the Columbia River.

"Deep well pump delivery systems are not assured of a permanent water supply," Obermiller said. "Water for many of the irrigation wells is held in basalt and soft gravel beds, and they are going dry. Some circles have already been forced to shut down and others are threatened. The State Engineer won't allow any more wells to be built in the critical ground water areas, so the only alternative is the Columbia River since surface water is scarce at best."

Working on a $109,819 contract from the Stanfield and Westland Irrigation Districts which obtained a grant from the Pacific Northwest Regional Commission, the 20 OSU researchers are trying to determine how water can be delivered to farms, and what the impacts of new growth will be.

"Large corporate farmers can cope with the water shortage. They can afford to pump water out of the river for agricultural use. But the small farmers can't afford to do that. While the irrigation districts are seeking to restore their water delivery systems and increase operating efficiency, these efforts cannot provide a long-term solution to the water problem," said Obermiller.

"Some of the problems we're trying to answer before our contract expires in July of next year are just how much the 'average' farmer can afford to pay for water and how it can be delivered. We need to find out who owns the land, where existing water systems are and where new systems should be located," he said.

Some data is already in. New water pricing possibilities have been identified, and past rates of growth in irrigated crop production analyzed. The researchers are compiling a series of six maps with special overlays which will help them accurately analyze the problem of water delivery. In some cases, water must be transported 15 miles to reach the circle farming areas, across many types of soil and privately owned lands.

But, the OSU researcher said, the problems of the Northern Columbia River Basin counties will not stop when the water problem is resolved. Coping with growth is equally as important, he said.

"Prior to the new growth, cities in the area were viewed as being service centers for the agricultural sector. But when growth came to agriculture, it affected the rest of the community, too," Obermiller said.

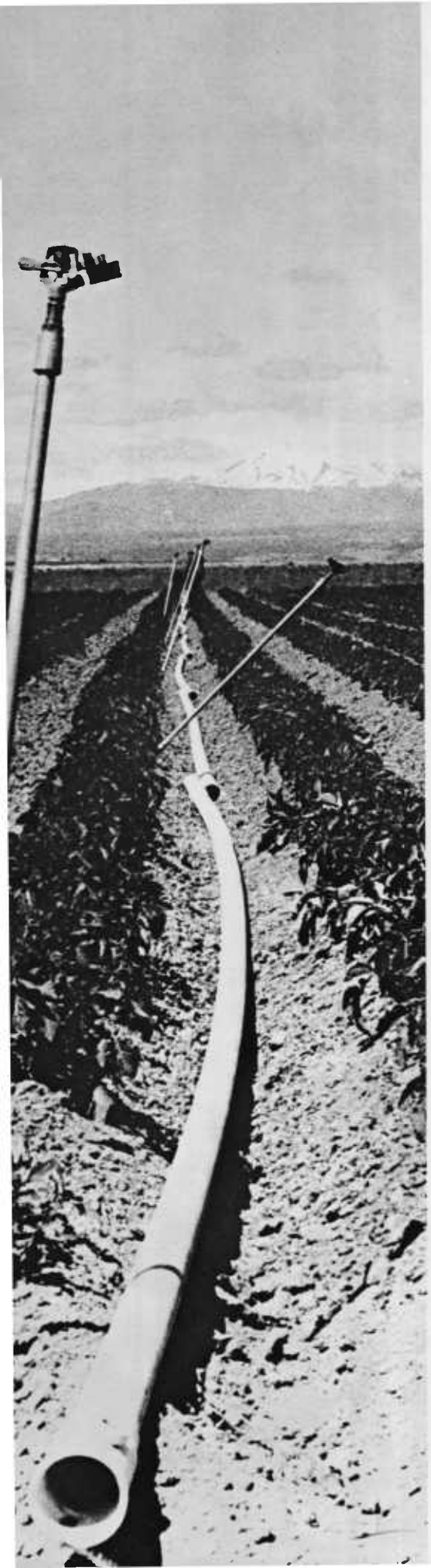
About 40,000 persons now live in the three counties and the population is expected to top 58,000 by 1981. Schools are already over-enrolled and as many as 3,650 children may enter elementary schools by 1977.

"The tax base can't keep up with the demand for community and school services and there are other needs such as transportation, roads and housing which must be met. As many as 6,000 new housing units will be needed by 1977, and a whole host of other problems related to economic growth and development are already upon the cities of the area," Obermiller said. These changes have been documented in a special task force report for Governor Straub prepared under Obermiller's supervision, and are illustrated in a documentary slide series to be made available in the near future.

Part two of the OSU study will be directed at examining the problems which are linked to the growth of agriculture, industry and business. Community services, population and the labor force, agribusiness and the industrial sector will all be studied.

When the tri-county study is completed and a report is released, Obermiller said the people of the area will have more solid information to be used in tackling their problem. Findings will also be useful to state and federal agencies seeking to assist local residents in coping with the strains of rapid economic growth.

"In a sense, the problems of the area are both financial and educational," Obermiller said. "If people don't realize they have a problem—or know how large it is—they won't know how to solve it. We're trying to provide them with some of the information that will help them with their future decisions."



Center of interest

Redmond Station stretches the growing season

Turn desert into rich farmland.

An unreasonable request? Not to farmers in Central Oregon.

For many years, farmers in Deschutes, Crook and Jefferson counties have been transforming land once considered suitable only for growing sagebrush into prosperous farmland. With the help of irrigation, their crops of alfalfa, peppermint, potatoes, grasses and grass seed have flourished, adding nearly $18 million annually to the area's economy.

Also helping transform the land has been the Central Oregon Experiment Station. Researchers started investigating the problems limiting Central Oregon's agricultural potential in 1947 when the Station was founded.

"Low rainfall and frequent late spring and early fall frosts limit crop choice in much of the area," said Malcolm Johnson, Station superintendent.

"Also, Central Oregon is one of the few places in the United States where all soils are influenced to some degree by volcanic pumice."

Degree of pumice influence varies, but most of the soils in the region are shallow, light and low in organic matter, creating irrigation and fertility management problems. Proper irrigation management is a top priority since rainfall in the irrigated portion of the three-county area averages only 8-9 inches annually. Crops must be studied carefully to determine how they can be grown more successfully and new crops must be tested to determine whether they can adapt to the growing conditions.

All this study means hard work for Experiment Station agronomists Johnson and William Murphy. They conduct research on two sites—a 25-acre reclaimed desert spot near the Redmond airport and a 40-acre parcel of irrigated land near Madras.

Over the years, a long list of accomplishments has piled up.

Potato yields were increased eight tons per acre when Station researchers discovered older, irrigated fields with heavy pumice influence responded to heavy applications of potash fertilizer. The new information and correction of other deficiencies helped convert several marginally productive areas into the highest potato-producing fields in Central Oregon. And another ton per acre potato increase was realized when researchers recommended increased applications of a of a phosphate fertilizer.

Other fertilizer tests also increased crop yields. Researchers discovered that nitrogen efficiency in bluegrass fields varied with the source of the nitrogen applied, helping growers save on fertilizer costs by eliminating less efficient sources of nitrogen. Reduced yields were also prevented because researchers determined nitrogen requirements of bluegrass increased as the stand became older.

Variety testing is another important way researchers help Central Oregon's agriculture. Station scientists tested Hyslop and McDermid wheat and Cayuse oats, sparing growers potential losses. New potato varieties, mint varieties resistant to verticillium wilt and alfalfa varieties resistant to bacterial wilt are tested at the Station along with potential new crops such as meadowfoam and sunflowers. Station researchers are also involved in a project aimed at finding a livestock grain capable of being grown in the area, eliminating the need for producers to import feed grains.

Irrigation, weed control and disease concerns are still other problems studied by scientists Johnson and Murphy.

It all adds up to a big challenge for the Central Oregon Experiment Station scientists. But in a part of the state where farmland must be carved out of the desert, keeping agriculture healthy is vital.

Station superintendent Malcolm Johnson examines some uncleared land adjoining the Central Oregon Experiment Station, above right, and a productive irrigated test plot on the Station, right. Above, hearty test plots of barley grow near the Station offices.

Shady business branching out --beautifully

Try thinking of autumn without thinking of trees.

Every year, nature cushions man against the inevitable chill of winter by putting on a show of warm fall color. But for many homeowners, the show is over too soon because the shade tree which should have been a blazing beauty fizzled unceremoniously with the first rainfall.

To help Oregon consumers avoid choosing the "wrong" trees, OSU horticulturist Robert Ticknor has tested shade trees at the North Willamette Experiment Station for 10 years. His on-going research identified trees that quickly produce the shade and beauty which makes a house and yard more pleasant.

"Since many persons move frequently, they're interested in trees that will grow quickly," Ticknor said.

Consequently, the Experiment Station scientist tested 237 types of trees, charted their rates of growth, times of foliation, period of bloom, fruit characteristics and time and duration of fall color. Also studied were insect, disease, wind and cold problems. (A partial list of the study results appears on this page.)

"We found out some interesting things during the study and were able to refute some common notions about trees. For instance, the general notion that oaks grow more slowly than other trees; the scarlet oak and willow oak were two of the fastest growing trees in this experiment," Ticknor said.

Although both oaks grew to heights of more than 30-feet in 10 years, the fastest growing tree was the London plane, which grew from a six foot-four inch whip to a 39-foot giant in 10 years.

"The London plane is also popular because it stands up to air pollution and grows in many types of soil," Ticknor said.

The soil at the North Willamette Station where the shade trees were grown is rich and well drained. The air is relatively clean, so trees which performed well under the test conditions might not fare as well in cities where heat is radiated off sidewalks and air pollution is present.

"It's important to keep in mind that we were studying landscape trees for the home owner, not street trees. Trees must be planted in the proper setting and must be treated well if the grower hopes to have good results," Ticknor said.

The Experiment Station scientist recommends planting a small tree—five to eight feet tall—because small trees cost less and grow quickly. But equally important as choosing the right tree is caring for it properly.

"Keep the area around the tree free of competing vegetation such as grass. Grass will rob the soil of the nutrients and water needed by the young tree and close mowing can damage the trunk. Mulch the area around the tree and fertilize and water it like a good lawn for best results," said Ticknor.

Good tree care and selection will have rewards other than pleasure, too, the scientist said. By planting deciduous trees on the south and west sides of a building, the need for summer air conditioning will be reduced because the tree will block out the hot sun. The building will be warmer in the winter, however, because the trees will lose their leaves permitting the sunlight to reach the building.

The shade tree experiment will continue at the North Willamette Station. New trees will replace older ones and Ticknor will continue to chart tree growth, perhaps branching out into areas such as street tree performance.

"We can grow a wide range of shade trees in Oregon. I hope with this information we can help consumers find out which trees are best suited to their landscaping needs," Ticknor said.

	Foliation	Bloom	Fall Color	Defoliation	Remarks
Acer campestre (Hedge Maple)	M	M		M	
A. ginnala (Amur Maple)	E	M	E	E	Yellow, orange and red fall color. Heavy seed producer.
A. negundo (Box Elder)	E	M	E	E	Early yellow fall color.
A. n. variegatum (Variegated Box Elder)	M	M	E	E	Interesting green and white leaves.
A. platanoides 'Crimson King' (Crimson King Norway Maple)	M			M	Red foliage all summer.
A. p. 'Drummond' (Variegated Norway Maple)	M		E	E	Interesting green and white leaves.
A. p. 'Emerald Queen" (Emerald Queen Norway Maple)	M	M	M	M	Good yellow fall color.
A. p. 'Fassens Red Leaf' (Fassen's Redleaf Norway Maple)	M	M	M	E	Red foliage all summer. Best fall color and earliest defoliating of red leaf types.
A. p. 'Royal Red' (Royal Red Norway Maple)	M		M	M	Red foliage all summer.
A. p. 'Schwedler' (Schwedler Norway Maple)	M	M	M	E	Leaves red in spring, dark green in summer. Yellow fall color.
A. pseudoplatanus purpureum (Spaeth Sycamore Maple)	M	M	M	M	Purple underside of leaves.
A. rubrum 'Autumn Flame' (Autumn Flame Red Maple)	M	E	E	E	Round-headed tree with excellent red fall color. First tree to color.
Acer saccharum (Sugar Maple)	M		M	M	Yellow-orange fall color.
Batula maximowicziana (Monarch Birch)	M	E	E	E	Yellow fall color. Creamy white bark in fourth year. Less leaf miner damage than European White Birch.
B. papyrifera (Paper Birch)	M	M	E	E	Good yellow fall color. White bark fourth year. Less leaf miner than European White Birch.
B. pendula (European White Birch)	M	E	M	M	White bark develops in third year. Aphid and leaf miner problems.
B. p. Gracilia (Cutleaf Weeping Birch)	M	M	E	E	White bark develops in fourth year. Aphids and a few leaf miners.
B. p. verrucosa (Clump Birch)	M	E	M	L	White bark develops in fourth year. Aphids and leaf miner.
Carpinus betulus fastigiata (Upright European Hornbeam)	E		M	M	Upright habit. Yellow fall color.
C. caroliniana (American Hornbeam)	M	E	E	M	Yellow, orange and red fall color.
Cercis occidentalis (California Redbud)	M	M		M	Purplish-pink pea flower. Dark red new growth.
C. silquastrum (Judas Tree)	M	M		L	Purplish-pink pea flower. Reddish-green new leaves.
C. s. alba (White Judas Tree)	M	M	M	M	White pea flower. Pale green new leaves.
Cladrastis lutea (American Yellowwood)	M		E	M	Trees died back after planting. Good yellow fall color.
Cornus florida Cherokee Chief' (Cherokee Chief Flowering Dogwood)	M	M	E	M	Red fall color. Reddist of the pink dogwoods.
C. f. 'Cloud 9' (Cloud 9 Flowering Dogwood)	M	M	E	M	Red fall color. Best white flowered dogwood.
C. f. 'Rainbow' (Rainbow Flowering Dogwood)	M	M	E	M	Leaves yellow and green turning orange and red. White flower.
C. f. 'Welch' (Welch Flowering Dogwood)	M	M	E	M	Leaves white, pink, green turning pink and maroon. White flowers.
Cornus kousa chinensis (Chinese Dogwood)	M	L	E	M	White flowers in June. Good red fall color.
Crataegus oxyacantha 'Paul's Scarlet' (Paul's Scarlet Hawthorne)	E	M		M	Attractive red flowers. Very dense, twiggy habit.
Fagus sylvatica atropunica (Purple European Birch)	L		M	L	Purple leaves all summer. Brown leaves persist in winter.
Gleditsia triacanthos 'Sunburst' (Sunburst Honeylocust)	L	L	E	M	New foliage yellow, turning green later. Yellow fall color.
Laburnum anagyroides vossi (Voss Goldenchain)	M	M		L	Yellow flowers. Sparse growth.
Lagerstroemia indica (Crepe Myrtle)	L	L	M	M	Bloom in late summer. Good red fall color. Slight twig dieback in cold winters.
Liquidambar styraciflua seedlings (American Sweetgum)	L		M	L	Yellow-orange and red fall color.
Liquidambar styraciflua cuttings (American Sweetgum)	M		M	L	Yellow to red fall color
Liriodendron tulipifera (Tuliptree)	E		E	M	Yellow fall color.
Magnolia kobus (Kobus Magnolia)	M	E		M	Showy white flowers.
M. sprengeri (Sprenger Magnolia)	M			M	
M. stellata (Star Magnolia)	M	E		M	Flowers over a long period.
Nyssa sylvatica (Black Gum)	L		E	E	Excellent red fall color.
Oxydendrum arboreum (Sorrel-tree)	M	L	E	M	One of the best red fall color plants. Good summer bloom.
Platanus acerifolia (London Planetree)	M			M	Bark starting to exfoliate at five years.
Prunus serrulata 'Amanogawa' (Amanogawa Flowering Cherry)	M	M	M	M	Columnar white-flowering tree. Good red and yellow fall color.
P. s. 'Kwanzan' (Kwanzan Flowering Cherry)	M	M	M	M	Round, pink-flowering tree. Good red and yellow fall color.
Quercus coccinea (Scarlet Oak)	L		M	L	Very good red fall color. Holds leaves.
Q. phellos (Willow Oak)	L		M	M	Willow-shaped leaves with yellow to red fall color.
Sophora japonica (Japanese Pagoda Tree)	M		E	M	Round-headed with yellow fall color.
Sorbus aucuparia (European Mountain Ash)	E	M	M	M	Very good red-orange fruit in fall.
Stewartia pseudo camellia (Japanese Stewartia)	E	L	E	M	White flowers June-July. Good red fall color.
Tilia americana (American Linden)	M			E	Large leaves. Aphids can be a problem.
T. cordata (Little-Leaved Linden)	L	L		E	Aphids can be a problem. Variable habit.

E = Early M = Medium L = Late

Shortnose sucker short on count

There's one born every minute?

Not, apparently, if the sucker is *Chasmistes brevirostris,* the shortnose sucker, a fish species found only in Upper Klamath Lake, Oregon.

The shortnose, one of 10 species of suckers found in Oregon, now is an endangered species. During two years of study by James K. Andreasen, OSU fisheries biologist, only about 60 specimens of the species were collected.

Although some species are common, little was known about Oregon's suckers before Andreasen began his study.

"There are three species of suckers that live in Upper Klamath Lake," said Andreasen, "the shortnose, the large-scale sucker and the Lost River sucker." All of them migrate up the Sprague River early in the spring to spawn. The migration, which came right at the time when winter food stores were being depleted, was a welcome sight to the Indians and early settlers. It's estimated that at one time the Indians captured and dried 50 tons of suckers a year.

The Lost River sucker, locally called "mullet," is a game fish in Oregon and can be legally snagged during the spring. There is a ten fish per day limit.

Most suckers have their mouth on the underside of their head and feed by sucking small animals off the bottom. However, the shortnose is unique in that its mouth is at the end of its head and it feeds by straining zooplankton out of the water with the use of many long, fine gill rakers.

Another species, also endangered, lives in the remnant lakes found in the Warner Valley in southeast Oregon. About 14 inches long, it develops brilliant red sides in spring and then fades back to dull grey color the rest of the year.

"OSU has collected only a few specimens in the last 20 years," said Andreasen. "We think it, too, is on the way out."

In 1896, five species of suckers were described from Klamath Lake on the basis of a few specimens. Not many more specimens were collected until 1947 when Carl Bond, Andreasen's major professor at OSU, collected them as a masters degree student. Bond and others decided that the five species described by earlier ichthyologists really included only three.

"But when I began my study, we found there had been four species," said Andreasen. "One species had been eliminated in 1955 by fish control operations in Lake of the Woods and now only three remain."

However, the main reasons the population numbers of both species are down are dams and water diversions.

"The suckers used to go far up the Sprague River to spawn," said Andreasen. "Now the river has been dammed and all the suckers spawn in a limited area below the dam. The use of Lost River as an irrigation system has really eliminated the Lost River sucker and the shortnose. Every stream in the Warner Valley has at least one dam blocking

access to the upstream spawning areas," he reports. "In addition, there have been natural ecological changes in Upper Klamath Lake that may have affected the well-being of the shortnose sucker."

Andreasen and Bond will propose that the shortnose sucker and the Warner valley sucker be listed as endangered species by the U.S. Fish and Wildlife Service.

Another problem of the shortnose sucker is identification. Few people who fish, including some officials, can tell the three sucker species in Klamath Lake apart, however Andreasen's research has shed new light on ways to identify them.

Most suckers have another problem. Many fishermen regard them as too bony to take home, a reaction that is thought to have begun in the South where the abundant sucker did not fight when caught and was considered less desirable, eventually becoming known as a trash fish.

"The sucker's bony reputation is not deserved," said Andreasen.

"Suckers aren't bonier than other fish, despite common belief. They have sweet, white meat, that is especially good smoked or canned."

Less can mean more--in lime

Use less lime—and spend less time mixing it into the soil.

That's the advice soil scientist Marvin Kauffman has been giving growers who must combat soil acidity with lime.

"We found in our research that lime doesn't have to be mixed with 100 percent of the surface soil for good crop yields. Plant roots will seek out limed regions in the soil," he said. "Partial mixing of lime at a lower rate of application gave greater yields than the same amount of lime thoroughly mixed with soil."

Kauffman suggested growers partially prepare the seed bed and apply the recommended amount of lime then mix it in with a disc or cultivator. Once or twice over the field should suffice.

"Lime shouldn't be plowed under because it is then concentrated at the bottom of the plowed layer and is out of reach of the seedling's roots," he said.

"The amount of lime needed depends on soil type, the amount of soil acidity and the crop that is to be planted," said Kauffman.

One application of lime will be sufficient for five to ten years depending on soil type and the crops grown. The soil should be tested every two or three years, however, to monitor the changes in the acidity level and to help in planning a balanced phosphorus and potash fertilizer program.

"Using more than you need is a waste of money—usually it won't do any good at all and sometimes it can do some harm. Micronutrients such as zinc can be affected by over-liming," Kauffman said.

One of the more sensitive crops to acid soil conditions, is alfalfa, Kauffman said, but even crops like rye grass which

can tolerate very acidic soil will respond to lime treatments. A soil test is a must, however, when a different crop is to be planted in a field.

Kauffman conducted his research on three farms in varying soil zones of the Willamette Valley. His work will continue, concentrating on exactly how plants respond to excess soil acidity.

Vitamin study oldsters get E

Vitamin E. Will it really reduce the risk of heart attack and increase sex drive as some food fadists claim?

Elizabeth Yearick, OSU professor of foods and nutrition, is skeptical of the claims, especially as they pertain to older persons.

She has been conducting a large research project aimed at assessing the nutritional status of 100 older persons in Corvallis, and vitamin E was part of the project.

The basic questions Yearick sought to answer in the vitamin E study were whether older persons had lower intakes of the vitamin than younger persons and whether those intakes had any correlation with levels in blood plasma. She also wondered whether gender played a part in vitamin E utilization.

"Out of the 20 older persons sampled in the vitamin E study, 15 didn't take any vitamin E supplement at all. Five took 200 to 400 units per day which is 15 to 30 times more than the recommended daily allowance," Yearick said.

Vitamin E is found normally in vegetable oils, wheat germ, corn and produce. Yearick thought since older persons generally eat less, they would have a lower intake of vitamin E.

For comparative purposes, the food intakes of the older persons were compared to those of 10 young persons between the ages of 21 and 27. All subjects answered questionnaires regarding their eating habits and underwent physical examinations.

"As we had suspected, the young persons had more vitamin E in their diets. They had the recommended daily allowance, but the older persons had less than the RDA," Yearick said.

"But both young and old subjects appeared to be consuming enough vitamin E to protect the polyunsaturated fatty acids in their diets. The need for vitamin E is closely related to the intake of polyunsaturated fatty acids. Vitamin E is an antioxidant which protects the polyunsaturated fatty acids from deterioration," she said.

The older women studied had more vitamin E in their blood plasma than their male counterparts, but there was not a great deal of difference, the Experiment Station researcher said. However, the five women who used vitamin E supplements had more vitamin E in their plasma than did the unsupplemented persons.

Universities in eight Western states are making nutritional studies of various age and cultural groups. The OSU Home Economics School studied those persons over 60 years of age in a middle income level. Most were between the age of 75 and 80, and about one-third of those studied had college educations.

"We had a difficult time obtaining volunteers in lower income brackets or on welfare," Yearick said.

When the study revealed abnormal conditions, the subjects were informed of their conditions, but most were healthy, busy and happy. Scientists did not discourage those taking the large vitamin E supplements from continuing.

"No one has proven that excess of vitamin E is harmful, and we didn't want to disrupt the faith of the study participants, so we didn't recommend cutting it out of the diets of the five participants who did take supplements," Yearick said. "Most got the right food by eating what comes naturally."

Hunt for killer to help calves

A serious war is being waged under the microscope at OSU.

The enemy is pneumonia. The victims are calves.

"Pneumonia is considered one of the most serious economic problems of all for cattle producers," said John Schmitz, associate professor of veterinary medicine who is conducting the Experiment Station research.

"Studies conducted outside Oregon estimate 15-20 percent of all calves in dairy herds die each year—a large portion from pneumonia. Because of the environmental differences pneumonia is not such a serious disease of baby calves in beef herds; however later in life when the weaned calves are shipped to feed lots, pneumonia becomes the most costly disease in beef production."

Schmitz hopes to find out what causes and spreads pneumonia in calves by studying some newly recognized members of the bacterial world—mycoplasmas.

"Mycoplasmas are the most primitive types of bacteria, capable of growing in cell-free media and so small they were at first thought to be viruses. They are difficult to grow in the laboratory and equally hard to classify because many kinds exist and because not much scientific work has been conducted on them," Schmitz said.

During the last year, Schmitz and his associates have isolated more than 200 strains of mycoplasmas obtained by flushing the lungs of 100 calves infected with pneumonia. Samples were also taken from healthy calves for comparison.

Previous studies had shown links between mycoplasmas and pneumonia in pigs, chickens and humans, and possible links between mycoplasmas and arthritis.

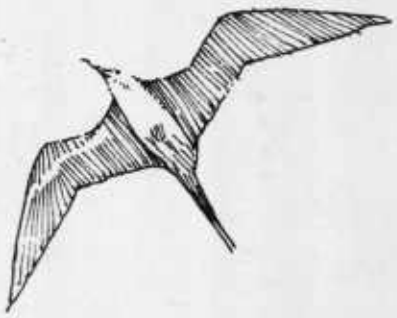
"We hope to identify the prevalent strains of mycoplasmas this year, then study the types of mycoplasmas which influence or cause pneumonia," Schmitz said.

The work then will come out from under the microscope. Test animals will be inoculated with suspected mycoplasmas at the OSU animal isolation laboratory and observed for signs of pneumonia.

"When we have determined whether mycoplasmas do play a significant role in calf pneumonia, we can start research aimed at producing a vaccine to counteract pneumonia," the OSU veterinarian said.

Meanwhile, the major microscopic battle goes on.

Oregon visitor a rare bird



Oregon had an unusual visitor last summer—a Magnificent Frigatebird.

Two OSU wildlife scientists reported sighting a *Fregata magnificens,* first record of the bird in the Pacific Northwest.

Thomas R. McCabe, and his assistant, Keith Miles, were conducting a waterfowl nesting survey by boat on the Umatilla National Wildlife Refuge section of the Columbia River July 1 when they saw the immature bird.

The weather was clear and calm so the presence of the Frigatebird (also called a man-o'-war-bird) could not be directly attributed to a coastal storm system. Miles took pictures of the gull-like bird, before it continued upstream after circling twice within 100 feet of their boat.

The American Ornithological Union Check-list of North American Birds lists the range of the Magnificent Frigatebird in the eastern Pacific from Baja California south to the Galapagos Islands and the coast of South America.

According to literature, the only recorded sighting north of California and west of the Rocky Mountains was in February, 1935, when a Frigatebird was collected at Tillamook Rock Lighthouse.

When mature, the long-winged sea bird has a wingspread of 7-8 feet and a scissorslike tail, usually folded to a point. The Frigatebird soars easily, its extremely long, angled wings seeming to have a hump in the middle. The bill is long and hooked.

The man-o'-war-bird's wings have been developed at the expense of its feet, which are very small and weak; it can hardly stand upon them, and can hardly walk; it never dives and is a very poor swimmer; it becomes wet and helpless in the water.

The male is black with a red throat pouch (inflatable in the breeding season); the female has a white breast and dark head.

Voiceless at sea, the Frigatebird issues a gurgling note during courtship.

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