

Oregon's Agricultural  
**Progress**  
Spring, 1976



Agricultural Experiment Station  
Oregon State University



John R. Davis  
Director

## Advise and consent

The American public places a high priority on accountability and involvement these days, especially in dealing with government agencies and both large and small businesses. This accountability at times has resulted in more paperwork, increased government regulation and red tape and generally increased costs to the public. One organization that has worked to expand its accountability at virtually no cost to the public is the Agricultural Experiment Station—each of the departments that are a part of the Station and all the branch experiment stations throughout the state.

Without much fanfare but with considerable effectiveness, we have achieved a close relationship with all segments of Oregon's agriculture. It is a relationship that is not unique to agriculture and rural people, and illustrates the keen interests among leaders in agriculture to improve the potential of research to serve all people in Oregon.

The concept to organize the Oregon Agricultural Research and Advisory Council was developed about 30 years ago—years ahead of the general movement for advisory groups. Since its first meeting in 1948, the Council, with special emphasis on research and development of agriculture, has worked diligently with Oregon State University and the Oregon Agricultural Experiment Station, as well as the Oregon Legislature, the State Board of Higher Education and the Governor.

The Agricultural Research and Advisory Council consists of 37 organizations representing agricultural and related industries. Representatives of these organizations appointed to the Council volunteer their time and expense in attending meetings. Membership is open to all agricultural and related organizations

representing producers and processors on a statewide basis, after approval of a majority of members attending any annual meeting. The latest two organizations to become members are Women for Agriculture and the Malheur County Legume Seed Growers League. This Council meets at least annually with the administrators of the Agricultural Experiment Station to review programs in progress and to assess the priorities for new directions in research.

Members of the Council have consistently spoken clearly on issues confronting Oregon agriculture and on problems associated with our environment and with the consumer. In a very realistic way, therefore, the programs of the Agricultural Experiment Station are in close touch with the publics we serve, and our accountability and involvement of the public in our program are demonstrated by our ability to deal promptly with real problems in agriculture.

In addition to the Agricultural Research and Advisory Council, several other groups provide advice directly to various research activities in the Agricultural Experiment Station. Several of the branch experiment stations have encouraged the development of an advisory committee consisting of local citizens; at all of the stations the facilities are open to the public, field days are scheduled and program developments are related to those needs expressed by local leaders.

The reasons for mentioning public involvement in our decision-making are to assure our readers that we are accountable for our activities, that we are well aware of the public trust placed in the Agricultural Experiment Station and to invite other organizations and citizens to participate in the process of planning agricultural research. Confrontation



# Progress

tactics or adversary politics should not be necessary in Oregon agricultural research, for already our public has participated in our activities. We wouldn't want it any different way.

Current members of the Agricultural Research and Advisory Council:

Oregon Animal Health Council  
Columbia River Salmon and Tuna Packers Association  
Northwest Food Processors Association  
Nut Growers Society of Oregon & Washington  
Oregon Association of Conservation Districts  
Oregon Association of Nurserymen  
Oregon Broiler Growers Association  
Oregon Cattlemen's Association  
Oregon Dairy Industries  
Oregon Dairymen's Association  
Oregon Essential Oil Growers League  
Oregon Farm Bureau Federation  
Oregon Feed, Seed, and Suppliers Association  
Oregon Hay Growers Association  
Oregon Horsemen's Association  
Oregon Horticultural Society  
Oregon Milk Producers, Inc.  
Oregon Potato Growers Association  
Oregon Poultry Industries Association  
Oregon Seed Growers League  
Oregon Seed Trade Association  
Oregon Sheep Growers Association  
Oregon State Beekeepers Association  
Oregon State Fur Breeders Association  
Oregon State Grange  
Oregon Turkey Improvement Association  
Oregon Wheat Growers League, Inc.  
Oregon Wildlife Federation  
Pacific Bulb Growers Association  
Portland Wool Trade Association  
Sheep Advisory Council-Oregon Purebred Sheep Breeders  
Southwest Oregon Cranberry Association  
The Oregon-Washington Farmers Union  
Western Oregon Livestock Association  
Winegrowers Council of Oregon  
Women for Agriculture  
Malheur County Legume Seed Growers League

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## Cover

The colorful *Papaver bracteatum* poppy is just one of several new crops being tested in Oregon this year. For stories, see page 5.

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# Sunflowers shine as seed, silage source

Central Oregon has a potential new crop, *Helianthus annuus L.*—the sunflower. It can substitute for corn as a forage for silage, to provide an energy supplement for cattle and is a source of high quality seed oil and seed for human and bird consumption.

In preliminary testing, William Murphy, agronomist at the Central Oregon Experiment Station, Redmond, found sunflowers grew very well under Central Oregon conditions.

Earlier OSU work in the Corvallis area tested high oil hybrid sunflowers as a source of vegetable oil for human consumption. Wheeler Calhoun, in charge of testing new crops for OSU, said the potential yield was a ton per acre, an acceptable commercial yield.

"Tests in the 1960s showed sunflower production in the Willamette Valley required summer irrigation—one of the problems was with sprinkler irrigation equipment because when the ground was wet the shallow-rooted top-heavy sunflowers toppled over," said Calhoun.

"Even earlier—in the late 1920s—the sunflower was investigated as a silage crop by the late Harry Schoth."

Murphy's objective was to compare the performance of varieties of different sunflower types and maturities when planted at various dates. He obtained the seed from North Dakota State University.

Six oil varieties and four confectionary varieties were planted on four dates ranging from April 11 to May 27 at Redmond and Alfalfa. Blackbirds ruined the trial at Alfalfa.

In the Redmond test, April 28 and May 12 plantings produced the highest seed yields of 1,825 pounds per acre. Only May 12 and May 27 plantings were harvested for forage. Both plantings produced an average of 4.8 tons of dry matter per acre.

"Whole plants of each variety from the May 12 planting date were analyzed to determine protein, fiber and lignin

## A new plant for new crops

One of Oregon's top priorities, most growers and agricultural leaders agree, is a new plant—the mechanical kind to extract oil from various crops.

"Such a plant probably could work on soybeans, meadowfoam, sunflowers, poppies, safflower and other oilseed crops," said Wheeler Calhoun, who is in charge of new crops for OSU.

"Research has showed these crops and others will grow and produce in Oregon—the problem is processing."

Crambe, for example, was tested and in 1966, OSU released enough seed to plant 300 acres. Crambe produces erucic, a fatty acid that gives oil a high temperature tolerance, needed particularly for the steel industry's continuous casting process.

Because there was no processing plant, growers were forced to dump their seed.

Oregon is still looking for its first extraction plant to handle many crops.

contents," said Murphy. "Crude protein ranged from 9.14 to 11.42 percent, crude fiber ranged from 5.77 to 8.98 percent and lignin ranged from 5.77 to 8.98 percent."

Oil content, he found, ranged from 30.2 to 45.5 percent. Average yield of oil was 678 pounds per acre.

Murphy will repeat the variety trial this year. He also will look at the effect of plant population and nitrogen rate on yield of forage of the Issanka variety. Issanka produced the most protein per acre and is lower growing than the other varieties—a plus under sprinkler irrigation.

Plantings will go in at Alfalfa, Madras and Redmond.

SUNFLOWER FORAGE (FOR SILAGE) YIELDS

| Varieties    | REDMOND PLANTING DATES |        |
|--------------|------------------------|--------|
|              | MAY 12                 | MAY 30 |
|              | Tons DM/acre           |        |
| Peredovik    | 4.73                   | 5.38   |
| Sputnik      | 5.25                   | 6.46   |
| Krasnodarets | 3.21                   | 4.76   |
| Issanka      | 5.10                   | 4.54   |
| Hybrid 896   | 4.92                   | 4.34   |
| Hybrid 201   | 5.27                   | 5.80   |
| Arrowhead    | 4.93                   | 4.06   |
| Mingren      | 4.18                   | 4.15   |
| D694         | 5.45                   | 3.45   |
| Sundak       | 4.19                   | 4.86   |

# Poppy crop may fix codeine shortage

Red poppies are growing in the fields of Oregon.

They are a special kind being tested in Oregon, Maryland, Arizona and Washington because they are an excellent source of codeine but not of opium and its derivative heroin, the principal addicting drug of abuse.

The poppies—a wild species called *Papaver bracteatum*—are being watched by drug company officials, physicians and others who view the world shortage of codeine with alarm. The medical profession relies on both codeine and morphine to treat pain; codeine also is a cough suppressant.

They are produced from opium and poppy straw concentrate obtained from the opium poppy (*Papaver somniferum*).

In the United States, more than 95 percent of morphine extracted from opium is converted to codeine for use in anti-pain and anti-cough preparations by three drug firms licensed to process narcotics. In recent years, a shortage of legal opium has developed through the world and is now becoming acute in the United States.

Opium's big drawback is that it also is the source of heroin. Banned in the U.S. for any use, heroin is manufactured abroad from morphine derived from illicit opium.

Unlike the opium poppy, the red poppy—*bracteatum*—growing in Oregon, does not produce either opium or morphine. Discovered in 1967 in Iran, it grows wild in the mountains there and in other parts of the Middle East.

*Bracteatum* produces an alkaloid called thebaine which can be converted to codeine by an intricate chemical process. To make heroin from the alkaloid would require converting codeine to morphine and then converting morphine to heroin, conversions so technically difficult that the process is unattractive to illegal operations.

Thebaine occurs in all parts of *bracteatum* except the seed, with straw containing about 2 percent. Because *bracteatum* is a perennial and contains about 8 times as much alkaloid as the opium poppy, the yield of codeine per acre is expected to be much greater than for *somniferum*.

"The natural habitat of *bracteatum*, which requires nearly three years to reach maturity, is about 3,000 feet elevation in Iran," said Wheeler Calhoun, Experiment Station agronomist in charge of testing new crops who is directing work on poppy plots at the Hyslop Farm near Corvallis and at branch experiment stations at Medford, Redmond and Pendleton.

"We want to determine whether *bracteatum* is adapted to Oregon's climate and soil conditions, find out what cultural requirements are necessary to maximize yields of thebaine, and, hopefully, to improve the plant through selection to find varieties that produce the highest level of thebaine."

With seed from the U.S. Department of Agriculture, which is cooperating in the Agricultural Experiment Station project, Calhoun planted one-tenth acre at Hyslop Farm in April, 1975. The poppies bloomed in May this year.

The poppies were ready for harvest the first part of June, when the capsules were starting to mature. About 14 inches of the stem, including the capsule, were harvested. The poppy grows to a maximum height of three feet.

After harvest, the poppy plants are dormant during the summer. In seedlings, the plants appear to die. In older plants, the crowns are more visible. In the fall, when soil temperatures drop and moisture comes, the poppies sprout again, continuing active growth during the winter months.

"Although the seeds in the capsule do not contain thebaine, they are a valuable source of an excellent edible oil," said Calhoun. "The roots do contain thebaine but have to be left to produce plants for the following year."

How long will the plants produce? Estimates range from 10 to 30 years.

"Their life cycle may be shorter in Oregon because of disease, insects or other environmental stress," said Calhoun. "But early tests by USDA showed that insect and disease problems were minimal."

In addition to the USDA and four drug companies, more than a dozen countries are doing research on *bracteatum*. None has succeeded in domesticating the plant. There is another drawback. It takes two years to produce mature *bracteatum* plants from seed. The opium poppy takes only one year.

Will *bracteatum* be a major crop of the future?

The answer may be found in a poppy field in Oregon.

# Onion seed: profit on paper

The pungent smell of onion is growing in the Rogue River Valley.

A "new crop" since 1972 when an acre was planted at the Southern Oregon Agricultural Experiment Station at Medford, onion seed is gaining popularity with growers.

In 1973, the first commercial crops were planted in the Medford area—15 acres. The next year, there were 25 acres. In 1975, about 60 acres were harvested and this year, the total will be about 100 acres, said John Yungen, agronomist at the Experiment Station in Medford. The nine growers will have fields of varying size, the largest about 20 acres.

Onion seed is not new to the Willamette Valley. Since World War II,

there have been a few acres of some seed, mostly breeders stock seed increases—a high cost, high value crop—grown annually.

In the Medford area, the crop is harvested by a regular combine which lays down a strip of paper and deposits seed heads of the onion on it. The paper cuts the loss of seed from shattering. After a few days of drying, the paper and heads are run through the combine again. The seed is then spread to dry before being sent to a cleaning unit.

"Harvest has been difficult," said Yungen. "In 1975, rain hit some of the crops while they were still on the paper and the loss of seed was considerable."

Harvesting now is in the transitional phase. Some growers harvest by hand; others use combines.

Another problem: weed control.

"Chemical control of weeds has been developed for spring-seeded onions grown for bulbs, but seed onions are planted in the fall and go through the winter," said Yungen. "Because of this, they battle a different class of weeds which get a head start. We are still working on weed control."

Problems? Yes, but the strong smell of success from onion seed is still in the air in the Medford area.

# Cabbage seed: success ahead --again

The Oregon cabbage seed crop is a legacy of World War II.

Spurred by wartime demand for vegetables, the growing of open pollinated seed became common in the Willamette Valley. For the last 15 years the production of cabbage hybrids has been increasing because Oregon's climate is especially and uniquely adapted to hybrid cabbage seed production.

N. S. Mansour, Extension vegetable crops specialist, estimated that the average hybrid seed acreage for the last 10 years in the Valley has been about 300, with this year's crop estimated to be 250 acres. Most of the acreage is centered around Eugene and Salem.

Cabbage seed has returned to become a "new" crop in the Medford area. During the war years, Otto Bohnert grew about 10 acres of cabbage seed at Central Point.

This year, agronomist John Yungen at the Southern Oregon Agricultural Experiment Station has an acre of hybrid cabbage seed.

"We want to check the yield and problems connected with harvesting to see if cabbage seed might mesh with onion seed production," said Yungen.

One grower tried three acres of hybrid seed in 1972 but lost the crop to a big freeze. Yungen planted 8-inch high cabbage plants in mid-September. Top leaves were discarded to decrease moisture evaporation and relieve root stress.

He will harvest the acre by hand about August 15. Commercial crops, if practicable, in the Medford area can be harvested by modified combines.



*Onion seed harvest near Medford.*





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# Sick alfalfa a critical patient

An Oregon State University microbiologist is exploring some nearly forgotten agricultural technology to find a cure for "sick" alfalfa.

Charles Hagedorn is the microbiologist. For 18 months, he has been trying to find out what was known about the important relationship between alfalfa roots and certain soil bacteria called rhizobia before the advent of the commercial fertilizer industry. He admits there is a long way to go.

"Our knowledge of rhizobia is underdeveloped because commercial fertilizers have been so inexpensive for the last 20 years. Not too long ago, no one thought anything of using fertilizers on legume plants if they showed signs of nitrogen deficiency. Then, within the last three years, the price of man-made nitrogen fertilizers jumped from around \$100 per ton to more than \$300 per ton and growers started thinking twice about using commercial fertilizers on crops which should be able to obtain the nitrogen to fertilize themselves," Hagedorn said.

Nitrogen is the most plentiful element in the atmosphere—making up 78 percent of the air we breathe. When a legume crop such as alfalfa is planted, rhizobia in the soil should infect the roots of the plant and form a symbiotic relationship. Rhizobia cells grow, protected in a special root casing called a nodule. Inside those nodules, the rhizobia can take atmospheric nitrogen and convert it into a form of nitrogen avail-

able to the plant. The plant then continues to provide what the rhizobia need to live and the rhizobia provide the plant with "natural" fertilizer.

Alfalfa plants have been termed "sick" when, for some reason not yet known, they are unable to be successfully invaded by the rhizobia.

"I've seen farmers do everything just right and still have 'sick' alfalfa," Hagedorn said. "The first four or five weeks the plants will look fine and then they start showing signs of nitrogen deficiency. We'll pull the plants up and there won't be any nodules on the roots at all. By that time, there should be 20 to 50 on each plant."

To help induce nodulation, growers use commercially grown rhizobia and mix them thoroughly with alfalfa seed just before planting. Hagedorn said such inoculations should give the seed more than enough bacteria to form the nodules, but, for some reason, the process just doesn't work at times. He estimates at least half the alfalfa planted in certain parts of Oregon fails because of "sickness."

"This is a very tough problem to study. Soil moisture and acidity are important but do not appear to be the crux of the problem, so now we have to consider more subtle parameters. Lack of micronutrients may be affecting the organisms, a virus may be present which kills them, or there may be high concentrations of phagocytic protozoa (single cell organisms) in the soil," he said.

Hagedorn is maintaining his objectivity about a possible cause but suspects commercially prepared rhizobia inoculum may be part of the problem. Only six facilities in the U.S. produce all the bacteria for the entire country, and five of the chemical plants are in the Midwest. The Experiment Station microbiologist suspects strains of rhizobia developed in the Midwest may not be compatible with soil in other parts of the country, including Oregon.

"During the 1920s and '30s, virtually every land grant institution produced rhizobia for farmers in their area who grew legume crops. From what I've read, there was not very much 'sick' alfalfa reported then, but the condition might not have been identified or reported. When chemical fertilizers became so available in the 1940s and '50s, land grant institutions stopped making cultures as demand lessened. However, if the nodulation problem is found to be linked with cultures foreign to a particular soil, we may have to start producing localized cultures again," Hagedorn said.

To test the rhizobia inoculum theory, Hagedorn started growing cultures from all over the U.S. and other parts of the world. He plans to increase and examine the strains, then test them in field trials to determine which strains will work the best.

"We have to assume that the native soil environment is where the rhizobia have to survive, so it becomes necessary to begin there" Hagedorn said.

"Sick" alfalfa has been reported primarily in central and northeastern Oregon, and also occurs in eastern Washington, northern Idaho and northward into Canada. However, Hagedorn said if more growers knew how to identify the problem, more cases might be reported.

"We may have a problem of recognition as much as anything else," he said. "Growers may not even be aware of the problem and may just be dumping on fertilizers to combat nitrogen deficiencies without realizing they have this problem. Many farmers have grown alfalfa and clover as non-legumes for years, but now they want to make the plants self-sufficient.

"Many factors influence legume development. The rhizobia may be dead from sitting out in the sun or being allowed to dry out before the seed is planted. Or the field may be dry when the seed is planted and the rhizobia may die then. Management is extremely important in growing legume crops and many growers just don't realize that," he said.

Luckily for growers and also for Hagedorn, the National Science Foundation has listed increased food production as one of its high priorities for future research funding. Since many important crops (soybeans, clovers, peanuts) are also legumes, Hagedorn said some funding will certainly be available to study problems dealing with rhizobia and nodulation development. Then maybe the cause and cure for "sick" alfalfa can be found.

"Right now there are no real answers to the problem of 'sick' alfalfa. Many scientists have studied the problem and have found no solution. But we'll try again. Perhaps by uncovering some old information and by communicating with scientists in other parts of the world, we'll find out something new.

"Australian scientists know considerably more about rhizobia and nitrogen fixation than we do because fertilizer has always been costly in that region. Perhaps further projects with them will help us solve this problem," Hagedorn said.

Meanwhile, "sick" alfalfa continues to be a terminal patient.

*Old rhizobia culture bottles in Charles Hagedorn's office date back to the days when most land grant institutions produced bacteria for legume farmers.*

*Center of interest*

# Hood River Station research fruitful



When the drab days of winter disappear and the snow begins to melt on Mt. Hood, more than 20,000 acres of pear, cherry, apple, peach and apricot trees start blooming along the Columbia River.

In Hood River County, at the western foot of the Cascades, more than \$11 million worth of pears and apples are produced annually. And in neighboring Wasco County's fruit-producing area, only 20 miles to the east, more than \$5 million worth of cherries, peaches and apricots are grown each year.

The Mid-Columbia Experiment Station has served the tree fruit industry

of the Columbia Basin since 1913. The Station is on 45 acres of state and county-owned irrigated orchard land two miles south of Hood River.

While many of the needs of fruit growers in Hood River and Wasco counties are the same, the two areas are separated by the ecological transition zone between Western and Eastern Oregon. Differences in geography, climate and length of growing season add to the complexity of tree fruit research.

Work on fruit disease problems at the Mid-Columbia Station has been cooperative with the USDA's Agricultural

Research Service since 1919. But diseases are only part of the research emphasis. Production and storage problems of apples and pears, insect control and variety testing are also studied.

During the Station's 63 years of operation, much has been learned about improving fruit production. Today, horticulturists including station superintendent Walt Mellenthin and Timothy Facticeau work with entomologist Robert Zwick and plant pathologist Paul Bertrand to expand that knowledge even further.

Diseases such as powdery mildew, fireblight, Cytospora fungus and storage decay are continual enemies of tree fruits and researchers are looking for new ways to control the diseases which will cost growers less money and prove less costly to the environment.

Pests, too, are perpetual problems to fruit producers. New ways to control pear psylla, leaf roller moths and cherry fruit flies were perfected by Experiment Station scientists, but still newer methods are being sought which will control pest population levels with safer biological, cultural and chemical controls.

Growth regulating chemicals are being tested on trees. Scientists think these chemicals may help improve fruit set, increase flower and bud hardiness, control vegetative growth and help thin trees as well as influence fruit maturity and reduce physiological disorders of fruit.

And research is continuing on frost control methods. By understanding how cold temperatures influence fruit trees, researchers hope to learn more about how to reduce damage. Using portable growth chambers, scientists can alter temperatures of individual tree branches, and determine exactly what happens to those budding branches and test ways to control bud damage.

*With the help of portable growth chambers (left) scientists are learning more about frost control. When fruit is ripe (above, right) busy crews takes measurements.*

Other aspects of production being investigated by Station researchers include weed control, drip irrigation, and rootstock and other variety testing. Periodically, special problems arise which require investigation. In recent years, the Station has been involved in studying the effects of air-borne fluorides on crops in the fruit-producing areas of Wasco County. Testing showed that atmospheric fluorides emitted by aluminum plants in the area can cause damage at levels lower than those required to produce visible symptoms on the fruit.

Station researchers also are trying to solve problems of fruit storage. Pears picked in a mature green stage are held in cold storage until they are needed. Then the fruit must be ripened carefully so it will taste fresh and juicy when it reaches the consumer. Apples, too, have storage problems which must be solved so consumers can have the very best quality fresh fruit available all year.

And that makes the fruits of the Mid-Columbia Experiment Station available to everyone.



# Umatilla tribes borrow eyes of economists



Stay rural or go urban—that was the choice.

But to the 1,250 members of the Umatilla Indian Reservation, the choice was clear. They didn't want increased urbanization on their northeastern Oregon reservation. They wanted to improve their agricultural potential and keep their lands open and rural. They also had an immediate concern for gathering information which would lead to effective zoning for the area under the Umatilla County zoning ordinance.

So last year the reservation's Farm Enterprise Committee, comprised of tribal members Sam Kashkash, Joe Sheoships, Mike Farrow and Al Shippentower approached the Department of Agricultural and Resource Economics at Oregon State University. They wanted OSU to help them analyze their resources and agricultural potential, and then provide information and advice about how to make the system work.

It wasn't the first time OSU economists had been called upon to help with such a problem. In 1958, a committee from the Warm Springs Indian Reservation in Central Oregon had asked for and received similar assistance.

Assistant Professor James Fitch became leader of the Umatilla research project last summer. He had worked on a similar project in Washington before coming to OSU in 1972.

"The three tribes on the Umatilla Reservation—the Cayuse, Umatilla and Walla Walla—have considerable agricultural resources and, in recent years, they have been using more of those resources and leasing less land to others. The Farm Enterprise Committee now farms some 1,300 acres, and individual tribal members own about 30,000 more acres with agricultural potential," Fitch said.

Approximately 600 tribal members live on the reservation which encompasses 247 square miles of land, starting at the eastern edge of the City of Pendleton. In the past, tribal members often sold land on the reservation to non-Indians, and approximately one-half of the land is now owned by non-Indians. Much of the rest of the land is leased to non-Indians.

"The tribes don't want to push non-Indian farmers off the reservation but they are interested in purchasing back land as it becomes available," Fitch said.

Increased farming by Indians on the reservation would help the tribes regain control of their land in two ways. By generating more income with increased farming ventures, the Indians would develop the money needed to purchase reservation land as it becomes available. As more land is regained, farming can become more efficient because land can be divided into more easily farmable blocks.

In 1974, a tribal development plan was prepared, establishing a goal of expanding farming activities by 5,000 acres within 10 years. The Farm Enterprise Committee obtained a \$20,000 grant from the federal Economic Development Administration to plan the change. The OSU economists are helping tribal members develop plans for meeting that goal.

"The 1,300 acres they now use is not a lot of land but they have been expanding. The Committee has purchased over 900 acres during the past ten years. Now they are going outside for the type of advice which will help them expand even more," said Fitch.

Income from farming activities on the entire reservation is currently more than \$3 million annually. Crops grown include wheat, barley, and green peas, but with irrigation, other crops may have potential for the area.

Fitch and his assistants are collecting and compiling data about the agricultural lands on the reservation. They estimate that approximately 35 percent of the total reservation is farmable. Soil, irrigation potential and erosion problems are being studied and potential crops are being evaluated. When the study is completed in August, the OSU economists can provide a complete analysis of how the tribes should undertake the expansion and present some options for growth.

"The Farm Enterprise Committee is becoming more and more like a corporate agricultural enterprise. This study is concentrating on the business-oriented details of land management," Fitch said.

"The Umatilla tribes want land in agricultural use. They want the land to be open and rural without developments and they don't want the City of Pendleton spilling out onto the reservation. But to do that, they must develop the ability to use the land more efficiently themselves," he said.

With the help of OSU, they are doing just that.



## 'Summer flu'

### Rx: c-o-l-d

Don't be fooled by the summer flu. Marge Woodburn, head of OSU's department of foods and nutrition, warns that "summer flu" is just another name for food poisoning.

Food poisoning can occur during any season. But it is more likely to become a problem during summer months when foods such as sliced ham, boned chicken and other cooked meats, cream sauces, custards, puddings, potato salad and other main dish salads are left out of the refrigerator.

"The USDA recently changed its recommendation regarding the amount of time perishable foods can be left in the open safely," Woodburn said. "Formerly, they had said four hours was the maximum safe time, but because of research conducted at OSU and elsewhere, that recommendation now has been lowered to three hours."

In Agricultural Experiment Station research at OSU, Woodburn, Toshiko Morita and their graduate assistants inoculated food samples with *Staphylococcus aureus* bacteria. When staph bacteria multiply, they produce enterotoxin—or food poisoning products. Inoculated food samples were placed in varying temperatures and left for varying periods. Enterotoxins were found in gravies after three hours.

"Enterotoxin producing bacteria need a warm temperature, nutritious food and sufficient moisture to multiply," Woodburn said. "The bacteria are killed if foods are heated to 165 degrees Fahrenheit (74 degrees Celcius), but humans recontaminate food by coughing, sneezing or just talking over it. If the food isn't cooked again, bacteria have a chance to grow, and even if food is cooked after sitting out too

long, it will not be safe because enterotoxins are very stable."

Growth of bacteria and then the production of enterotoxins is most rapid at temperatures above 65°F (18.33°C) but can occur in temperatures as low as 44°F (7°C) or as high as 116°F (47°C).

"We don't really know how common food poisoning is because victims and their doctors don't report cases of food poisoning," said Woodburn. "It is a short-lived, acute illness and it is very, very rare for anyone to die from food poisoning."

But to avoid getting sick from food poisoning, use care in handling and storing all perishable foods. And never leave them sitting out for longer than three hours.

## Pesticide drums need 3 rinses

The third time really is the charm when it comes to disposing of pesticide containers, four Oregon State University researchers believe.

James Witt, Max Deinzer, John Lamberton and Patricia Thomson—all agricultural chemists—studied containers which had been rinsed out three times and also commercially cleaned containers to determine how much pesticide remained in the containers after each process.

Their study confirmed that triple rinsing is a sound policy both economically and environmentally.

"An 'empty' 55-gallon drum can retain a quart or more of pesticide formulation," said Witt, an Agricultural Experiment Station and Extension chemist.

"If the pesticide cost \$20 to \$40 per gallon, a farmer could be throwing away \$5 to \$10 if he failed to rinse out the drum and pour the rinse water into his sprayer. Our new

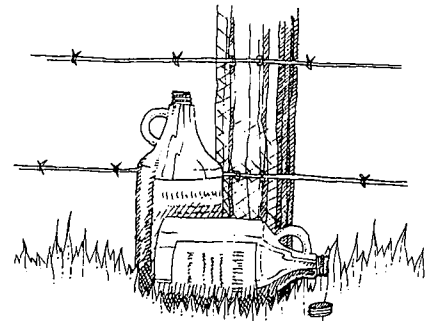
findings confirm that farmers actually save money with each rinse."

Triple rinsing has been recommended to farmers for several years by the OSU Extension Service and now is about to become almost a necessity because of new regulations recently established by the Oregon Department of Environmental Quality.

Farmers still may bury five triple-rinsed containers on their own property each year, if surface water and ground water are protected. Additional containers must be sent to authorized landfill sites.

Unrinsed containers may be taken only to a special, privately-owned hazardous waste disposal site in Gilliam County. Farmers will pay shipping and handling costs to get containers to the site, plus a premium rate for container disposal.

Triple rinsed containers, however, need not be sent to the hazardous waste disposal site. Nineteen



landfill sites throughout the state were authorized by DEQ to accept triple rinsed containers after July 1.

"This can be allowed because of the OSU research findings which show that only a negligible amount of chemical remains in triple rinsed containers," said Witt. "However, the containers still cannot be reused for other purposes."

The OSU agricultural chemist said that although environmental costs

and health hazards are less tangible than economic loss, they may represent a far more costly aspect of failure to properly rinse containers.

"It doesn't take much imagination to realize that a few hundred empty but unrinsed pesticide containers in a small area or landfill can result in a concentration of chemicals similar to a spill with its associated hazards," Witt said.

And the containers—which legally cannot be recycled—can be used for other, possibly fatal purposes.

"It is easy to forget what was in those containers and reuse them for another purpose," Witt said.

"Unfortunately, as the history of the container is lost, the hazard to the public increases. No one in Oregon has died from the misuse of a pesticide container, but there are tragic examples in other states of people misusing pesticide containers. Residual pesticides in those containers can kill and have killed both humans and animals."

## Rhododendron gets gift: smallness

Mothers soon may have a special plant to symbolize their day: the rhododendron.

Robert Ticknor, an Oregon State University horticulturist based at the North Willamette Agricultural Experiment Station near Aurora, has perfected a method of bringing some rhododendron varieties into full bloom while the plants are small enough to be sold in florist shops.

"Since rhododendrons in all areas of the U.S. normally bloom near the second Sunday in May—which always is Mother's Day—small container-grown rhododendrons could be promoted as the plant for this day," Ticknor said.

If the container-grown plants gain acceptance by commercial nurseries, some mothers in Oregon probably will receive the plants as gifts in 1978.

The small size of the plants makes them easy to ship and handle so they can be sold as poinsettias are at Christmas and lillies are at Easter.

Also, the potted plants can be left indoors for a short time before being moved outdoors where they eventually will grow as large as other rhododendron varieties.

However, not all rhododendrons lend themselves to Ticknor's treatment. Most bloom after two or three years of field growth, then are sold as landscape shrubs.

The OSU researcher took cuttings from parent plants, rooted the cuttings then forced the small plants to bloom by lengthening growing days in the greenhouse under artificial light and by using fertilizers.

Using the same methods, some varieties can be brought into bloom for Valentine's Day (February 14) if they are taken into the greenhouse earlier, he said.

"The container-grown plants would be more adapted for this market than field-grown stock and most retail outlets would prefer container-grown plants because they are easier to maintain and cleaner to handle," Ticknor said.

## Livestock snack on bakery wastes

Crumpled potato chips, slightly stale cookies, dead bread.

A recent study conducted at OSU by animal nutritionist D. C. Church confirmed that such wasted human food actually is good animal food.

"In our study, dried bakery product processed by BW Feed Company in Portland was fed to

sheep. In one test, bakery wastes made up 20 percent of the ration while in another test, they were 40 percent. The remainder of the feed was alfalfa pellets," Church said.

Results showed the bakery wastes—which contain between 10 and 11 percent crude protein, eight to 10 percent fat, low levels of mineral elements plus starch and sugar—were highly digestible.

If ranked against the energy value of corn, the energy value of dried bakery wastes is slightly higher when fed at 20 percent of the ration and slightly lower when fed at 40 percent of the ration. On most farms where bakery wastes are fed, however, they make up only between 10 and 20 percent of the ration.

BW Feed Company, which sponsored the study, is the only firm in Oregon or Washington processing bakery wastes. When foods such as cookies, candy, crackers, potato chips or tortillas become stale, they are collected, ground and mixed together. Paper and other material is sifted out then the mixture is dehydrated so farmers can safely store the feed until they are ready to give it to their animals.

Dried bakery wastes most often are fed to dairy cattle, but some hogs and beef cattle in Oregon also eat it on a regular basis.

## Strawberry goal: stem the viruses

By understanding the enemy, two scientists at Oregon State University hope they can win an important battle for strawberry growers.

The enemies are viruses, brought into fruiting fields from older, infected fields by aphids.

Certain pesticides can kill the aphids, but none act swiftly enough to destroy the pests before they

make their first feeding on new plants and infect them.

How much of their crop can strawberry growers expect to lose because of virus infections and what can they do to minimize those losses?

Those were the questions Lloyd Martin, North Willamette Experiment Station superintendent, and Richard Converse, plant pathologist with



USDA's Agricultural Research Service, asked when they started studying the problem of strawberry virus infections five years ago.

They tested Hood strawberries—the leading strawberry cultivar now grown in the Pacific Northwest. After 37 months, more than 90 percent of the plants in test plots at the North Willamette Station near Aurora had become infected with viruses including crinkle, mottle, mild yellow-edge, veinbanding and tobacco streak.

"An infection rate of one-third of the plants was the highest yearly rate we detected," they said. "But strawberry virus infection in Oregon is not uniform from year to year in the same location."

The two researchers believe that one or at most only a few species of aphids are the culprits carrying viruses from infected plants in the field to healthy plants, and believe management factors like time of planting and age of field can be varied to reduce plant-to-plant aphid movement and the amount of infection moving through a field.

Patterns of yield decline attributed to virus infections also were recorded by the researchers. The first year following infection, tested Hood

plants showed a yield loss of four percent when compared to virus-free plants. But when plants had been infected for more than one year, yield decline became more serious.

"Hood plants infected more than one year produced only 80 percent as much fruit as the virus-free control plants," the men said.

The number of fruit per plant and the total weight of above-ground plant material after harvest also were reduced more significantly in plants infected for more than one year.

Studies will continue at the Aurora station. Martin and Converse will try to supplement genetic resistance to strawberry viruses with new management practices to minimize losses.

And they hope by winning enough small battles, they can conquer the viruses permanently.

## Ryegrass yield not down from goose traffic

Grass gone from grazing geese?

Not likely, an OSU fisheries and wildlife graduate student has concluded.

Sally Clark, a wildlife researcher, studied 17 fields south of Corvallis on the W. L. Finley Wildlife Refuge and on private lands to determine what effect, if any, wintering Dusky Canada geese have on ryegrass fields.

Most Dusky Canada geese spend the winter in the Willamette Valley between Eugene and the Columbia River, so management practices in that area determine the future of the entire species. Some ryegrass growers—fearing geese damage their crop—have tried to keep the birds off their fields.

But after a year of study, Clark concluded geese have neither a harmful nor beneficial effect on ryegrass seed yield.

To test goose grazing impact, she built enclosures where geese could not graze. After the geese left for their spring breeding grounds on Alaska's Copper River Delta, she took down the enclosures and marked the spots so she could return to harvest the plots in summer. With no enclosures on their fields, ryegrass growers could fertilize and treat both grazed and ungrazed areas equally, without regard to the study.

She also measured average plant height, stem density and percentage of ground cover after the geese left to determine the impact of goose grazing on ryegrass fields.

In five fields, grass was significantly higher inside the enclosures. But further analysis showed why there had been a difference in plant height.

"The five fields were partially or wholly Dayton silt loam soil which is a poorly drained soil," Clark said. "The other fields in the study had moderately well drained soils."

But even the fields with significant difference in plant height between grazed and ungrazed plots recovered by summer when the fields were harvested. She found no significant difference in seed yield between grazed and ungrazed plots, which means geese had no significant impact on seed yields.

Clark concluded that unless growers find more than about 200 birds in their grass seed fields for more than about 80 days on 30 acres, they need not worry about crop damage. However, extremely wet weather conditions may mean changes in that estimate.

U.S. Fish and Wildlife Service management personnel hope the population of Dusky Canada geese wintering in Oregon and southern Washington can be maintained at 25,000 birds after hunting season ends.

Clark believes the Willamette Valley is capable of supporting that population without any serious problem to crop production.



Traditional Northwest Indian totem animals like this beaver soon may find themselves sharing their glory with plant symbols like wheat. Agricultural economists at OSU have been working for the last year with the Confederated Tribes of the Umatilla Indian Reservation to determine how the tribes can better utilize the agricultural potential of their land near Pendleton. For story, see page 12.

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