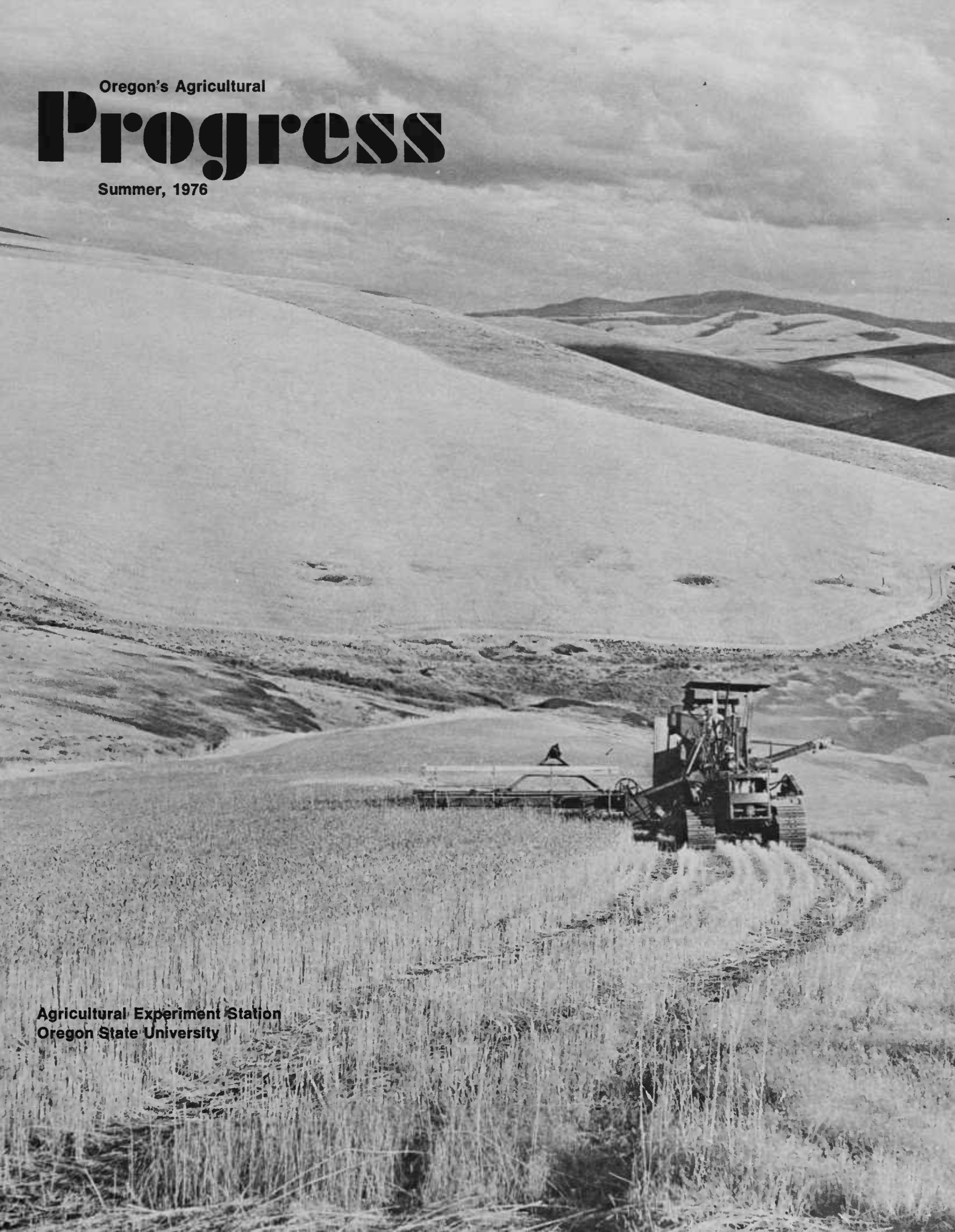
Oregon's Agricultural

# Progress

Summer, 1976



Agricultural Experiment Station
Oregon State University

Robert W. Henderson
Former Assistant Director

# A matter of modesty

Editor's note: Dr. Robert Henderson retired from Oregon State University last summer. It was our pleasure to provide him with a forum for his reflections after his many years of service to OSU and the Oregon Agricultural Experiment Station.

To show a humble opinion of one's value, abilities or achievements is to be modest. Most of the scientists with whom I have worked at Oregon State University during the last four decades have frustrated me with their devotion to modesty.

These able and well-trained scientists in the various research departments and branch experiment stations have made numerous scientific discoveries that have benefited every Oregon citizen through development of more nutritious and better quality foods; through more efficient methods of production, storage, marketing and utilization; through conservation, development and utilization of our natural resources; and by outlining procedures for improving the health not only of plants and animals but also the health and well being of men, women and children.

The frustration comes from knowing that the potential of these dedicated and competent OSU scientists and technicians to contribute to the solution of Oregon's economic problems and to provide better living to Oregon citizens is not being fully utilized.

Successful educators recognize that the teacher has not taught until someone has learned. The modesty of scientists and research administrators suggests that they have failed to recognize that scientific discoveries become more valuable as they are used by the public.

Even with the recent innovations in communication, the task of keeping all segments of our citizenry informed regarding the problem solving potential of the Land Grant University experiment stations is overwhelming.

Our legislators and public officials are frantically searching for solutions to the state's economic problems. Most of them have only a vague appreciation of the unique abilities of experiment station scientists that could be tapped to create new taxable wealth through the magic of research.

It is time for the scientists to shed their traditional cloaks of modesty and fully and unashamedly reveal their potential to provide solutions to problems that must be solved before Oregon's economy and the well being of its citizens can improve.

Progress

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# Nemesis: the nematode

Nematologist
Harold Jensen

For Harold Jensen, the enemy is a tiny worm—the nematode.

Since 1950, when he arrived at Oregon State University from the Berkeley campus of the University of California with a fresh Ph.D. degree in nematology, Jensen has been fighting microscopic thread or roundworms about 1/25-inch long which live and feed on roots, leaves, flowers, stems and seeds of plants.

His enemy is all around us. More than 400 species of nematodes are known to attack various plants and at least 100 are considered major crop pests in the world. Some nematodes are Oregon natives but many have come from afar in soil or with plant parts used for propagation.

Once introduced, nematodes spread by cultivation, irrigation, floods, soil erosion or any other action that disturbs soil and moves it from place to place.

"In Oregon, 15 nematodes are considered important pests," said Jensen. "And most crops are damaged in some way by more than one kind."

*Root-knot nematode on cucumber*

Nematodes spend most of their lives closely associated with host plants. All nematodes develop from eggs and pass through a series of larval stages and moults before becoming adults. Nematodes rob plants of food materials, destroy roots, stems and other parts. They can plug or malform the plant's circulatory system. They can stunt or stimulate abnormal growth but they seldom kill the plant.

They pose another serious threat. Nematodes are known to associate with other pathogens, causing a disease condition much greater than either pathogen or pest alone. Also, varieties of plants developed for resistance to certain diseases become susceptible when some nematodes are present because resistance is broken.

The presence of some nematodes in or on plant tissue can lead to condemnation or rejection of sale plants. In Oregon, nematodes have been responsible, in part, for marketing difficulties with daffodils, gladiolas, dahlias, ornamental shrubs and certified potatoes and strawberry plants, affecting all those industries.

"Root-knot nematodes are probably the most destructive nematodes in the state because they occur in so many crop lands and also because, as a group, they feed on nearly 3,000 kinds of plants including some common weeds," said Jensen.

"Mint, alfalfa, potatoes, sugar beets, small fruits, ornamentals and vegetables are often injured by these pests. We have extensive trials at Klamath Falls and in eastern Oregon, studying the effects of root-knot nematode on potatoes."

The root-knot nematode also has been reported as a serious pest on the first crop of potatoes after sagebrush removal. Since the nematode is not known to occur naturally in uncultivated land, it is likely introduction occurred with contaminated irrigation water or was accidentally introduced with infected seed.

"Similar conditions have contributed to the rapid introduction of the sugar beet nematode in Oregon and stubby root nematodes, which act as the 'corky ring spot' virus vectors, are ready and waiting for someone to bring virus-infected seed pieces to the area to start an epidemic in a developing potato crop," said Jensen.

In 1968, the barley root-knot nematode was found in a former ryegrass field in the Tangent area. Oats and barley had been planted in the field. After the field was replanted with perennial ryegrass, plant injury was not apparent and little attention was paid to the nematode problem.

Next, the barley root-knot nematode was found in bentgrass turf at a Eugene and a Portland golf club. In early 1975, the pest was found again in several spring barley fields in Polk and Yamhill counties. The barley was severely stunted.

"Such infections occurred in low areas and in heavy soil," said Jensen. "It was estimated that yield was reduced by 38 and 72 percent."

Then, in the summer of 1974, the oat cyst nematode (also called cereal cyst nematode) was found in a Washington County oat field. The cereal pest, potentially greatly destructive, had never been reported in Oregon or in the United States.

Since the discovery, Experiment Station researchers Jensen and Warren E. Kronstad have studied the life style and food hosts of the pest in the laboratory, greenhouse and field. Helping Jensen are Jack Pinkerton, research assistant who is in charge of nematode analysis at the OSU Plant Clinic in the Department of Botany and Plant Pathology, and Judy Armstrong, research assistant, who primarily works in the laboratory, searching for possible biological controls.

They have learned that the oat cyst nematode has an extraordinary appetite. It flourishes in barley, oats, rye, triticale and wheat plus several grass hosts. Fall-planted crops apparently tolerate injury without noticeable evidence but spring-planted crops are severely stunted and apparently yield poorly.

Using oat seed from Wales, researchers determined that the nematode found in the Willamette Valley is closely related to the strain occurring in western Europe.

In 1975, Jensen's team and other OSU scientists field tested more than 310 varieties or selections of cereals for resistance to the oat cyst nematode. Although none of the varieties was immune, some selections showed resistance and will be further tested this year.

Preliminary soil treatments with granular nematacides gave encouraging results of 40-50 percent reduction of nematodes for some materials. Extensive soil treatments will be established in the field this year to measure the effectiveness in controlling the oat cyst nematode and areas around the state will be monitored for presence of the European invader.

**More than 400 species of nematodes are known to attack various plants and at least 100 are considered major crop pests in the world.**

"Control of nematodes in Oregon starts with their identification, a procedure which often begins with the county Extension agent," said Jensen. "The agent may be familiar with the problem or send in a soil or plant sample to the Plant Clinic."

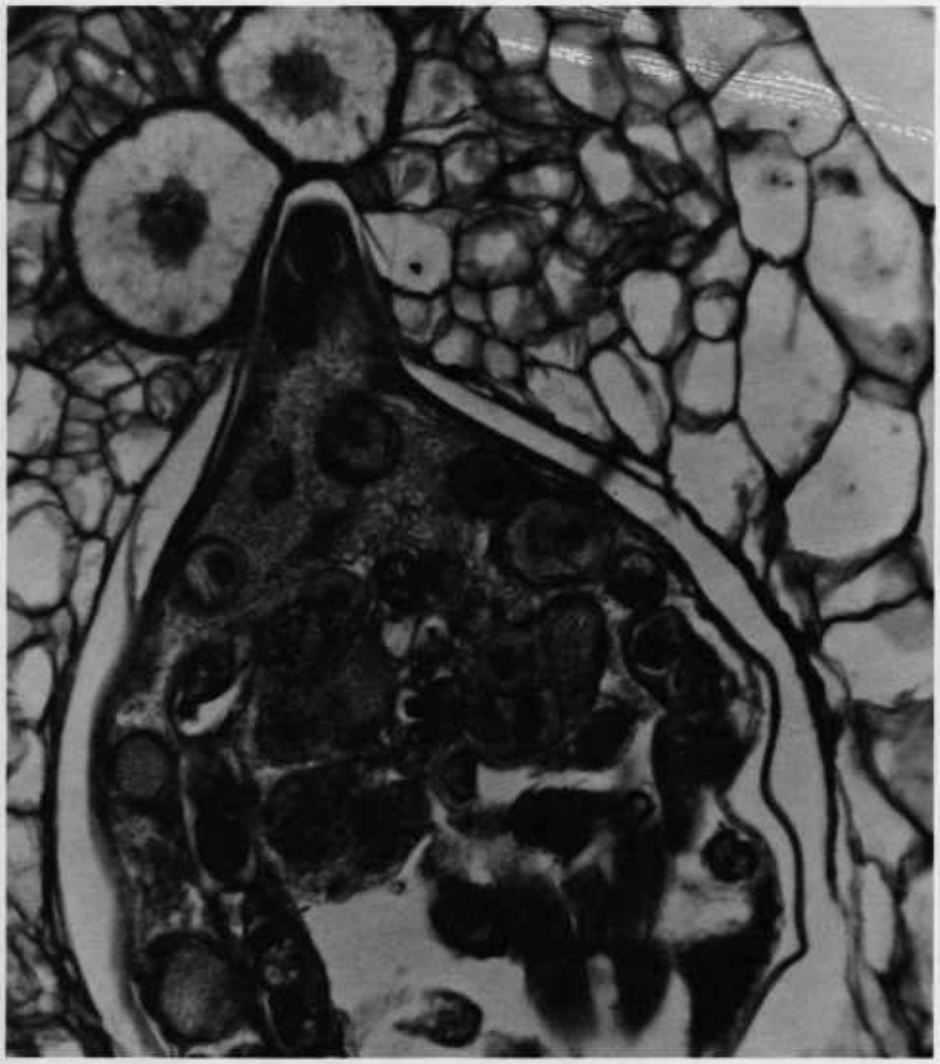
During his years at OSU, Jensen, with the help of other researchers, regulatory agents and growers, has discovered many plant nematodes in Oregon including those that attack sugar beets, barley, dahlias, mint, onions, hops, potatoes, lilies, daffodils, oats, bentgrass and Douglas-fir.

Once the pest has been identified, a choice of control measures can be considered—nematode-free propagation materials, resistant varieties, cultural control measures or soil fumigation.

Among the first to use soil fumigation in Oregon, Jensen used it to control lesion nematodes in maple, cherry, pear and apple trees and some ornamental seedlings, lilies and daffodils. It also was used to control stubby root nematode in onions.

Today, soil fumigation is becoming a standard practice for many of these crops.

Because weather, soil type and the short supply of some fumigants made soil fumigation impractical at times, Jensen also tested another series of compounds, systemics applied at planting time which control nematodes in lilies. The compounds also are being further tested for approval on other bulbs, tree shrubs, berries and potatoes.



But the fight against the nematode is hardly won.

"Not much has been done on chemical control with granular materials although various nematicides can be used to control some of the pests," said Jensen.

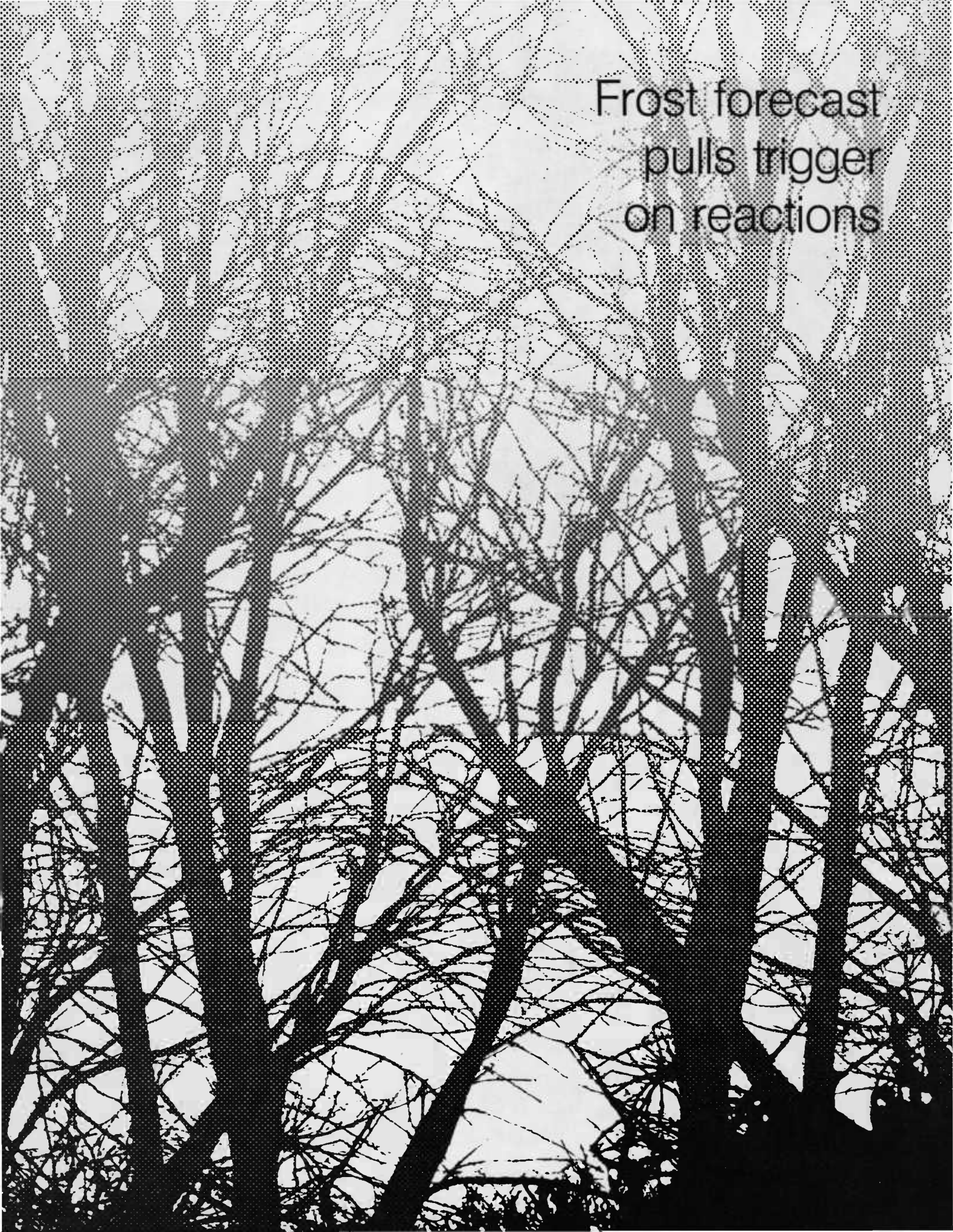
A better answer, he pointed out, is varieties of cereals and other crops that resist the nematode. There are no resistant varieties available for oat cyst or barley root-knot nematodes although Kronstad and his colleagues are tackling that problem.

In the meantime, Jensen, former president of the Society of Nematology, a 2,000-member international organization, exchanges information with colleagues in the U.S. and abroad about new nematode knowledge.

It is an important step in the continuing war against the nematode. As for Jensen, one of 300 U.S. nematologists, he agrees that back in 1950 when he took on the nematode he opened up some can of worms.

*Top: Female root-knot nematode feeds off the enlarged cells near the tip of her body. Since the plant cells must feed the nematode, the plant is robbed of the food it needs for growth.*

*Bottom: Eel-like root-lesion nematodes damage Oregon's nursery crops, bulbs, alfalfa and mint.*



# Frost forecast pulls trigger on reactions

Every spring, Jackson County pear growers play their own version of Russian roulette.

The weapon is weather, and growers must decide whether and how much to protect tender buds against deadly frost damage as carefully as the gambler assesses his chances of missing a bullet.

The U.S. Weather Service forecasts frost predictions for pear growers in Jackson County daily from mid-March until mid-May. Predictions of nightly temperature and dewpoint level along with a subjective prediction of whether frost protection will be needed are broadcast over radio and television stations beginning at 4 p.m. A revised forecast is announced later in the evening and an unlisted telephone number is available so growers can obtain the latest weather information directly from a meteorologist.

The impact of that frost prediction service was the subject of a recently completed four year Agricultural Experiment Station study conducted by three agricultural and resource economists at OSU.

Frank Conklin, A. E. Baquet and A. N. Halter found a number of other factors influence growers contemplating orchard protection, too.

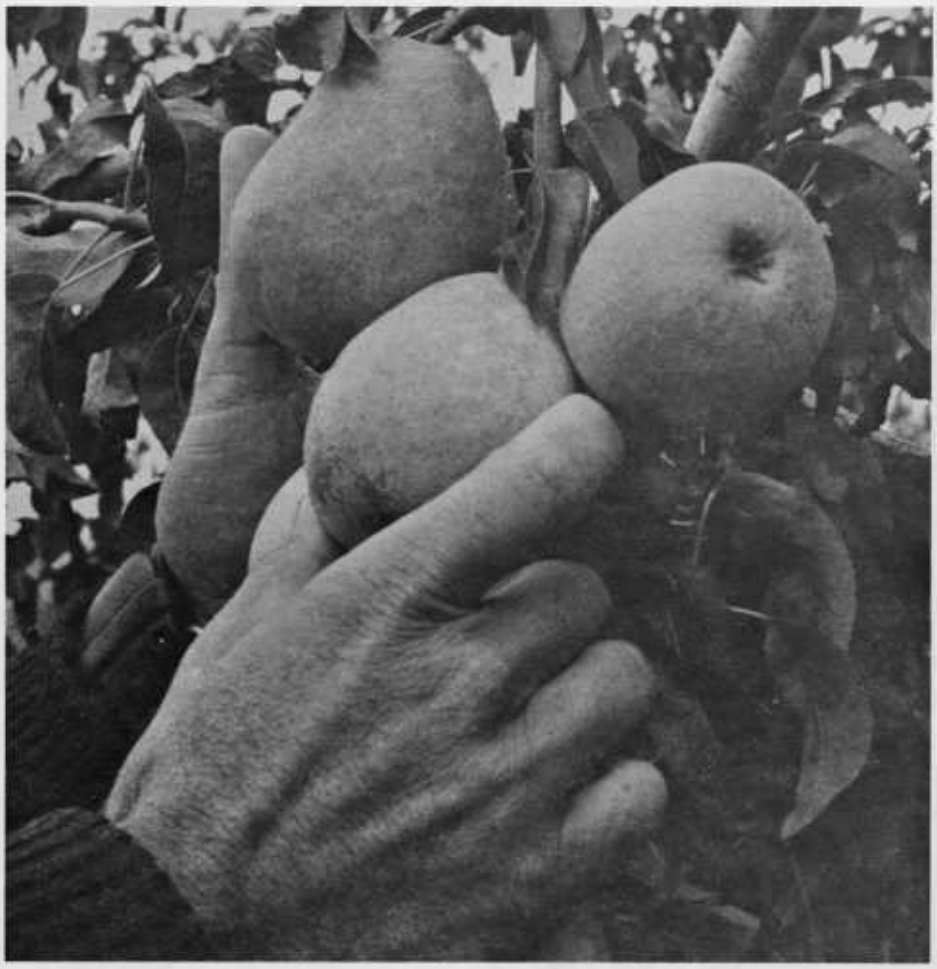
"Growers can lose up to half the buds on their trees to frost damage and not lose any money," Conklin said. "Some factors influencing their decision on whether to protect the orchards are the stage of bud development, expected minimum temperature, forecast, the grower's own feelings about the forecast, how far along the season is, the grower's capital position, debt commitment, alternate income sources —and his risk philosophy."

Three mechanical methods of frost control are used by pear growers. Sprinkling systems can raise orchard temperature by about four degrees for an estimated capital investment of $1,000 per acre. The most common frost control devices are orchard heaters which vary in price per acre from approximately $450 to $600 with 35 heaters per acre. Wind machines, which draw warm air above an inversion layer and pull it down close to the ground cost approximately $750 per acre.

In addition to equipment costs, growers also must pay for fuel, manpower and supervision for orchard heating.

But the growers realize that risk is an ever-present part of their business.

"Some growers are Reno-gambler types while others are strong risk averters," Conklin said.



*These pears made it through spring frosts without damage. Growers feel they can lose up to 50 percent of the buds on their trees to frost damage and still not lose any money.*

To test the value of frost forecasting, Conklin and his associates surveyed eight commercial orchardists and gained information about expected prices and yields, frost protection actions and costs, harvest costs and savings and risk strategies.

One grower was classified as a risk taker, three others were considered risk averters and the final four were willing to take moderate risks.

Fifteen sample years then were devised by a computer and an economic analysis of the importance of forecasting for the eight individuals was compared with the possible outcome of frost protection in each of the hypothetical years.

The economist found forecasting was generally more important to risk averters than to risk takers. Severity of the frost season contributed to the value of forecasting—especially when the potential for crop loss reached 50 percent or more. However, the study also confirmed that other factors are important in helping growers decide whether to provide complete protection, some protection or no protection to their crop each night during the frost season.

"Growers have a whole body of knowledge to draw upon when they hear the forecast," Conklin said. "And that body of technical and economic knowledge influences the value of frost forecasting information. Without it, the value of forecasting would be ridiculously high."

It is unlikely that economists could ever construct an easy-to-figure odds table to help growers in their decision-making process. Growers probably will always be their own masters in deciding the impact of each evening's frost.

But the odds are frost forecasting will continue to be an important part of that decision-making process.

# Pear misting gets the drop on Ms. Nature

Puting the brakes on nature could help stabilize pear production in the Medford area.

By delaying the blooming of pear trees until warmer weather, scientists at the Southern Oregon Experiment Station have found damage from frost, which can add up to a $5 million industry loss annually, can be minimized. Delaying bloom during warmer weather improves pest control and pollination.

Pears in the Medford area usually bloom April 8-12 but in some years blooms are two weeks early, the latter part of March. Blooms usually last 10 days. Then comes the fruit set, the most sensitive stage to frost.

As early as 1963, Porter Lombard, superintendent of the station, became interested in trying to get pear trees to bloom at the end of April or the early part of May, avoiding severe frost injury.

"We learned that if we delayed blooms 2 weeks by using mist to cool the trees, we could expect harvest to be delayed only 5 to 7 days, enough to beat the bad weather in October," said Lombard.

In 1974, Lombard began working with John Wolfe, agricultural engineer. Wolfe thought a foggy mist (a blanket of fog) should be used instead of wetting trees with a sprinkler system because it would mean less water and be more effective. The blanket would screen out the sun and keep down the radiation level.

The project team bordered a one-acre orchard and installed a pipeline 15 feet high. Additional nozzles down the center helped to produce fog under 300 pounds per square inch pressure. The system was turned on depending on prevailing winds.

However, the winds did not cooperate and when the days were warm, the system produced mist instead of a blanket of fog.

But the system, used on 70 mature, regularly spaced Bartlett and Bosc trees, delayed bloom 7 to 8 days. On other control trees, there was no delay.

In 1975, the system was redesigned. The border was eliminated. A system with mist nozzles every 5 feet was set up with a line down every tree row (25 feet apart) over the tops of trees. Pressure was reduced to 150 pounds. Wolfe designed a monitoring system to measure air and bud temperatures, net solar radiation, wind velocity and direction.

In early February, 1975, the misting system was started and ran until April, set to go on when temperatures rose to 45 degrees Fahrenheit or more. A grower, using sprinklers, cooperated with a control system.

Lombard and Peggy Tabor, graduate student, found an 11-day delay in bloom on Bartlett trees and 9 days on Boscs which had been misted.

In a hedgerow study, with a mist nozzle every 2½ feet and a 5-foot space between trees, full bloom was delayed 13 days. A sprinkler system at the station produced a 7-day delay on Bartletts and a 6-day delay on Boscs. The grower, using a sprinkler system, reported a 5-day delay with Bartletts and Boscs.

The investigators agreed that the system was more efficient at 45 degrees than at 50 degrees.

"There was no delay in harvest but the cool season in 1975 might have been a factor," said Lombard. "Even though, or perhaps because, harvest was not delayed materially, fruit size was down 12 percent."

Tabor said that pears on misted Bartletts were 6 percent smaller and on misted Bosc 13 percent smaller than pears from the control trees.

Pears from Bartlett trees with sprinklers were 15 percent larger than fruit from the control trees but Boscs under sprinklers produced 17 percent smaller fruit.

*Graduate student John Strang checks misting equipment.*

During the first two years of the project, no diseases were caused by misting or sprinkling systems. However, this year, some fire blight, a bacterial disease, did show up in misted trees when Bosc bloom occurred during the first 62-degree Fahrenheit mean temperature.

A possible pest control advantage was noted by Peter Westigard, station entomologist, on the egg laying of pear psylla in the spring. The misting operation apparently delays development of this major pear pest. Dormant sprays have been a concern because they have to be used when the weather is too cool for full effectiveness. With delayed development of the pest, other pesticides can be used more effectively during warm weather.

This year, new heads gave more efficiency to the sprinkler system which was tested at low pressure. Instead of running the sprinklers continuously, the team ran them for 2½ minutes then turned them off for the same period and kept repeating the cycle.

A new hedgerow mist test was designed with 4 lines 25 feet apart, with nozzles 5 feet apart on each line. To save energy, the team reduced the pressure on both mist systems to about 100 pounds. The monitoring system was expanded to include this new hedgerow plot.

"Our only concern with the sprinklers is that they put on too much water this year," said Wolfe. "The misting system used 20 gallons per minute per acre; the sprinklers used 80 gallons per minute per acre. Next year, the sprinklers will be tested at a much lower application rate."

Costwise, heating an orchard with oil probably runs about $400 per acre per year, since it averages about 1,200 gallons per acre. In comparison, the energy requirement for misting is about one-twelfth that of oil use.

The project scientists, working with Utah State University, are sending air temperature data to Utah for use in a computer model to better predict bloom in the Medford area,

While waiting for data from this year's studies before making recommendations, the station scientists point out that from 1975 data it can be concluded that the mist system was an improvement over sprinklers because mist produced more bloom delay for the same quantity of water.

But there are drawbacks.

Water use for bloom delay is not the same as using water for irrigation so takes separate water rights, important in an area where water is not bountiful. Also, irrigation district officials do not like to put water in ditches as early as January when the mist system is turned on.

In addition, if it is designed with a little more capacity, the sprinkler system for cooling trees to delay bloom also can be used to ice trees in time of low temperatures, thus "freezing" the trees for safety. The same pipes could be used to irrigate during the summer and to distribute fertilizers and pesticides. The mist system, because of spacing and height requirements, needs piping which cannot be used for anything else.

Said Lombard:

"Overhead sprinklers and mist system for delaying bloom gives us another method to prevent frost damage in pear trees, one that perhaps will be more attractive if oil prices get too high."

*Fog begins to creep through this young experimental orchard.*

# WHEAT

## *The staff behind the staff of life*

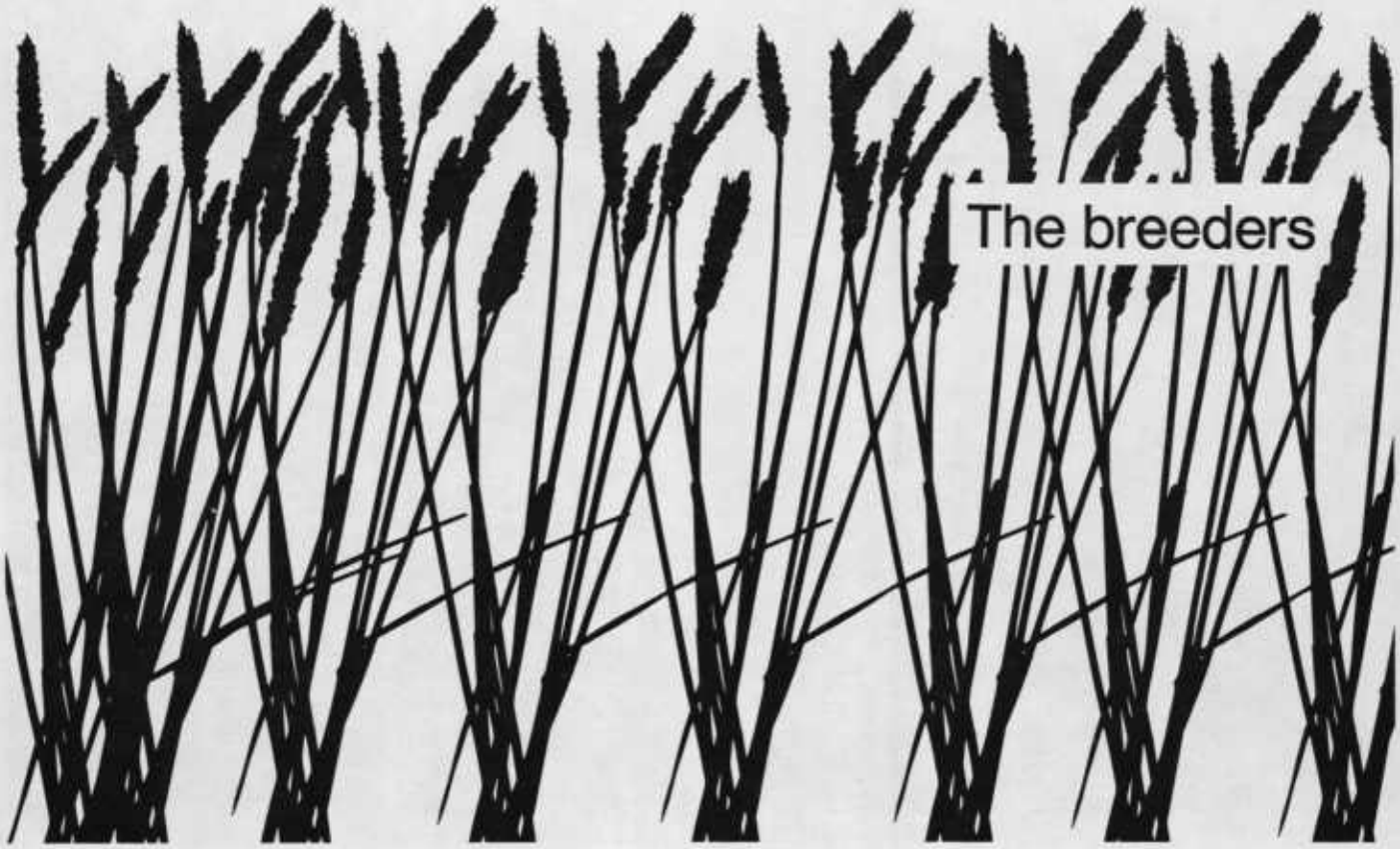
Pilgrims on a mission to feed the hungry.

That's one way of describing the OSU cereal breeding team which travels from Oregon to Ciudad Obregon in northern Mexico every April.

The OSU scientists—led by Warren Kronstad—have been making the trek every year since 1970 to help harvest experimental plots of wheat, barley and triticale in cooperation with scientists at the International Wheat and Maize Improvement Center (CIMMYT). The information and plant material they obtain in Mexico is brought back to Oregon and incorporated into OSU's cereal breeding program.

Kronstad said one of the most promising aspects of the cooperative venture is the development of new wheat varieties by crossing winter and spring wheats.

"We were concerned that with the development of Hyslop and McDermid wheat in Oregon we may have been approaching yield plateaus," Kronstad said. "And in Mexico, they were having problems in obtaining yield breakthroughs with their new spring varieties. But we now are beginning to see the advanced progeny of our winter and spring crosses tested under a wide



array of environmental conditions throughout the world and they truly look very, very superior."

Crossing winter and spring wheats is not a new concept. Varieties such as the classic Thatcher and the green revolution wheats developed by Nobel Peace Prize winner Norman E. Borlaug —who now heads the CIMMYT wheat program in Mexico—were developed by crossing spring and winter wheats. Kronstad said the difference now is in the systematic approach to the problem.

"All the winter and spring crosses are first made in Mexico," he said. "Then we bring the first generation back to Corvallis and cross it back to winter wheat. Similar materials are crossed to spring wheat in Mexico."

After these crosses, four or five more generations are tested at Hyslop Farm near Corvallis, a high rainfall area; the Sherman Experiment Station at Moro, a low rainfall area where wheat can be grown only every other year on a given field; and at a site near Pendleton, a medium rainfall area where wheat is rotated with peas. Experimental lines which do well at all three sites are very widely adapted. In addition, new potential varieties must yield well and resist some 20 limiting factors including shattering, rust and other diseases to be judged superior.

"Once a line has been shown to be superior, it is put into an international screening nursery program and sent to scientists in other countries," said Kronstad, "Because of the Rockefeller Foundation program and the United States Agency for International Development, elite germ plasm can be put into the hands of scientists in developing nations, making their programs much more efficient."

Superior winter wheat lines tested at OSU now are sent to 40 countries, representing 68 wheat breeding programs and every major winter wheat producing area in the world with the exception of the People's Republic of China. The CIMMYT program in Mexico carries out a similar program by supplying superior materials to the spring wheat regions of the world.

But while the OSU program is international in impact, the interests of the Oregon wheat growers are served, too. Many Oregon wheat growers have made the pilgrimage to Obregon with the OSU team.

"I'm always asked if our activities aren't jeopardizing Oregon's export market," Kronstad said.

"Oregon is a state which exports about 85 percent of its wheat crop. I feel strongly that we have to get some diversity. We've put most of our eggs into the soft white winter wheat basket, yet we look at the Japanese market and at our other export markets and they're starting to shift from soft white wheats to hard wheats. Hard wheats generally command a 10 cent or more premium, and yet we sit here in Oregon and watch the hard wheat be transported from the Midwest to Oregon and out of our own ports.

"Why should we do that? Why don't we take advantage of the situation and not only grow the market class soft white wheat but also go for the hard red winter and hard red springs. Some hard red springs are grown here now, but not very much. With our international work with CIMMYT, we do have a chance to diversify and put other market class wheat in the hands of our growers."

(Traditionally, soft white winter wheats have been the primary type grown in the Northwest. Those wheats are used for making pastries and noodles. Hard red wheats are used for making bread.)

The OSU-CIMMYT program not only will help Oregon growers diversify their

Kronstad

Kolding

Rohde

wheat crops; it also will help introduce other crops into the Northwest.

One such crop is triticale, a cross between wheat and rye. Triticale has the potential of becoming a major food crop and many problems previously limiting its commercial production are being solved in Mexico for the spring type varieties and at OSU for winter types. USDA scientist Bob Metzger is providing input to the triticale program.

"On our last trip to Mexico, we found some new lines of triticale with the plump kernels we have wanted. We also found some good winter wheat for breeding and some new lines of barley which will be incorporated into our breeding lines," Kronstad said.

Also identified during the April trip were two students working with CIMMYT who will study cereal breeding at OSU next year. OSU scientists have trained 26 students to conduct cereal breeding research since 1970 and all have returned to their countries where they are expanding on the CIMMYT breeding program.

"But it's an endless battle," said Kronstad. "We can't afford to slacken off. The life expectancy of a wheat variety is limited, and it takes 10 to 15 years to develop a new one. We gain some time by growing two crops a year —one at the Klamath Falls Experiment Station where the spring planting season is later and one in Mexico—but a new disease can wipe out any breeder's work almost overnight."

However, cereal breeding does have its rewards. A new soft white winter wheat and a new club variety with the proposed names of Stephens and Faro will be recommended for release by OSU this fall and Kronstad is optimistic about their future.

"Testing during the last three years in the uniform Western nurseries has shown this variety to be substantially No. 1 in performance. I think it will represent another breakthrough in yield and will out-perform Hyslop in many areas," Kronstad said.

"The new material coming along in our program now represents a great deal more genetic diversity than we have ever had before. The new wheat yields should be higher with growers having the opportunity of growing varieties representing several market classes each with superior milling and baking properties.

And to the pilgrims from OSU, those extra heads of grain hold the promise of the future.

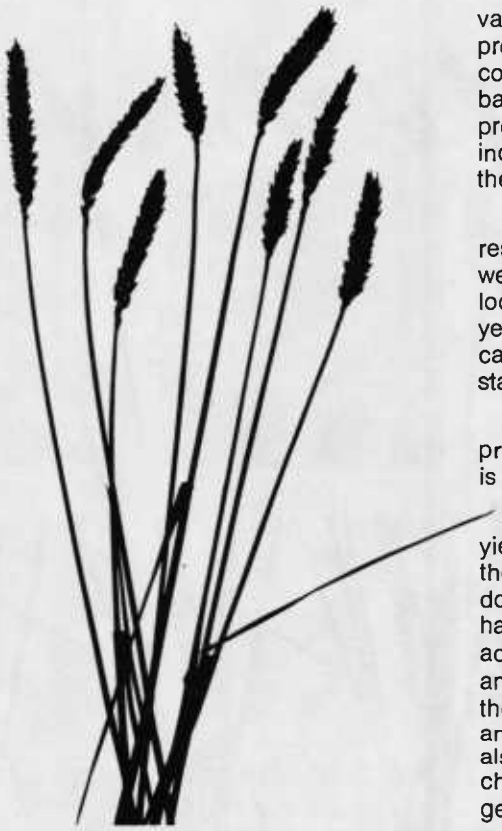
# Feed grain interest up

Feed grains are making gains, reports crop breeder Mathias Kolding.

In his research program at the Columbia Basin Agricultural Research Center (CBARC) near Pendleton, Kolding is changing feed grains—once considered a market of last resort for the state's cereal growers—into a good alternative crop.

"Our yields in wheat are at least equal to the varieties grown now for human consumption and appear to be equal to the newer types which will be grown in the future," Kolding said. "But it isn't really good enough. We have to outdo the standard varieties if we want growers to take feed grains seriously."

Nearly 90 percent of the state's wheat crop is exported, most of it to the Orient. Meanwhile, cattle producers must ship their animals to feedlots, many outside Oregon. Meat then must be imported back into the state.



Several years ago, Kolding said, wheat and animal producers began talking to each other and to the Oregon Legislature. Wheat was becoming a more important crop in all areas of the state, not just in the drylands of eastern Oregon where it always had been king, and where growers could produce little else. Restrictions on the numbers of acres of wheat grown in the state were causing wheat growers in the dryland areas concern. Wheat growers and cattle producers felt if somehow feed grains could be easily distinguished from grains produced for human consumption, cattle producers would have enough feed for their animals and wheat growers still could maintain their levels of production.

With special funding from the legislature, breeders Warren Kronstad and Charles Rohde made initial crosses using a genetic marker for feed wheat which gave a distinctive purple mark to the kernels. In 1971, an additional appropriation established Kolding's feed breeding program at CBARC.

"Our major effort with feed grains has been with wheat, but we also are working on barleys, triticale, oats and sorghums," he said.

Wheat is the most encouraging crop.

"Barriers imposed on standard wheat varieties are not imposed on this program. Those varieties have to conform with very strict milling and baking qualities to be accepted. In the process, there may be genes for yield increase which are dropped because they affect quality.

"But we don't have those sorts of restrictions," Kolding said. "Last year, we had some yield estimates that looked extremely promising and this year we may see some varieties that can produce 10-15 percent more than standard varieties."

Kolding said barley, the second most promising crop in the breeding program, is a neglected crop in Oregon.

"Barleys have good potential for yield and very few disease problems, but they need a lot of work. It's a crop that doesn't stand well and lacks winter hardiness. But it also has certain advantages. We can increase the fiber and use it with ruminant animals or take the fiber out and feed it to poultry, swine and other non-ruminant animals. We also have some simple genes for changing the amino acids in the protein genes. Lysine is the easiest to change and swine and chickens must have additional lysine in their diets."

Working with Kolding on the barley breeding project is Rollin Sears, an agronomic crop research assistant based at OSU.

A third crop with promise is triticale, a combination of wheat and rye.

"Some nice spring triticale has been developed but it can't compete with wheat yet," Kolding said. "At OSU, we're lucky to have Robert Metzger, a USDA cytogeneticist, who is trying to develop a winter variety of triticale. There is real promise for triticale and I think we will see some varieties produced for the Northwest. But before the farmer can make a decision to go with triticale, he has to be assured it can compete with his wheat crop, and we're not at that point yet."

The Agricultural Experiment Station researcher said he also felt oats were a neglected crop, especially as a feed for horses, pigs, chickens and calves, and said sorghum might offer yet another alternative forage crop.

"At one time, sorghum was grown in the Columbia Basin for broom straws, but that was the extent of the interest. Now, some new factors have been entered into the sorghum germ plasm; for instance, sorghums aren't as dependent on day length anymore," Kolding said.

One Columbia Basin grower tested sorghum on an irrigated circle field last year, and told Kolding the crop provided a good cover for the sandy soil, which is subject to wind erosion, and good forage material for his cattle.

The potential of feed grains? Kolding says it's growing.

# Newest variety 'clubs' others in yield tests

Releasing a new wheat variety always is a source of satisfaction and pride for a cereal breeder.

But for Charles Rohde, cereal breeder at the Columbia Basin Agricultural Research Center near Pendleton, the recent release of a club winter wheat variety carried a special significance.

Faro, the new wheat variety developed by Rohde, was named for his father, Frank August Rohde, who was a farmer.

"Faro is exceptionally well adapted to the lower rainfall areas of eastern Oregon where club wheats are commonly grown," Rohde said. "Faro yields exceeded both Paha and Moro, two of the most common club varieties grown in Morrow, Gilliam, Sherman and western Umatilla counties.

Developed from a 1968 cross of "Suwon 92"/3*Omar, C.I. 13748 and Moro, Faro equals Moro in test weight and is similar to Paha in growing habit, winter hardiness and seedling emergence, Rohde said.

It also shows good resistance to stripe rust, common bunt and lodging, a condition of the straw stems lying on the ground.

Yield data comparing Faro with other varieties grown in eastern Oregon, 1973-1975

LOWER YIELDING LOCATIONS

| Variety (Bu/A) | Moro | Pilot Rock | Rew Farm | Hold-man | Hepp-ner | Ar-lington | Condon | Avg. |
|---|---|---|---|---|---|---|---|---|
| Faro | 44.9 | 36.5 | 33.9 | 30.5 | 23.5 | 35.4 | 21.8 | 32.4 |
| Hyslop | 39.4 | 36.9 | 32.5 | 37.1 | 24.1 | 33.4 | 21.4 | 32.1 |
| McDermid | 35.1 | 36.8 | 33.6 | 32.6 | 26.8 | 32.6 | 22.8 | 31.5 |
| Rew | 37.0 | 33.9 | 32.0 | 34.5 | 23.5 | 32.8 | 25.1 | 31.3 |
| Luke | 36.3 | 31.7 | 32.9 | 34.7 | 23.8 | 31.8 | 22.2 | 30.5 |
| Nugaines | 39.4 | 29.5 | 32.6 | 33.1 | 23.9 | 33.8 | 20.3 | 30.4 |
| Paha | 34.9 | 32.8 | 30.4 | 33.6 | 23.5 | 32.6 | 20.7 | 29.8 |
| Wanser | 29.7 | 33.3 | 31.0 | 28.2 | 23.2 | 30.1 | 22.4 | 28.3 |
| Moro | 28.9 | 32.3 | 28.4 | 31.2 | 23.3 | 28.4 | 17.6 | 27.2 |
| Rank of Faro | 1 | 3 | 1 | 8 | 5 | 1 | 5 | 1 |
| No. years tested | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 18 |

HIGHER YIELDING LOCATIONS

| Variety (Bu/A) | Pen-dleton | Weston | LaGrande | Enterprise | Baker | Avg. |
|---|---|---|---|---|---|---|
| Faro | 77.0 | 64.3 | 63.2 | 55.6 | 48.2 | 61.7 |
| Hyslop | 79.5 | 63.9 | 59.9 | 58.9 | 78.6 | 68.2 |
| Luke | 77.1 | 61.3 | 62.7 | 57.6 | 82.2 | 68.2 |
| McDermid | 78.2 | 58.4 | 56.2 | 59.4 | 83.2 | 67.1 |
| Nugaines | 76.9 | 61.3 | 62.9 | 55.5 | 73.2 | 66.0 |
| Rew | 72.0 | 61.6 | 66.6 | 61.1 | 64.2 | 65.1 |
| Paha | 70.7 | 60.6 | 64.7 | 56.3 | 51.0 | 60.7 |
| Wanser | 56.0 | 59.8 | 54.9 | 53.3 | 65.0 | 57.8 |
| Moro | 59.4 | 55.2 | 54.7 | 51.7 | 53.2 | 54.8 |
| Rank of Faro | 4 | 1 | 3 | 6 | 9 | 6 |
| No. years tested | 3 | 3 | 3 | 3 | 2 | 14 |

Milling and baking trials also showed Faro to be a superior club winter wheat variety.

Thirteen acres of the new variety were grown in the Willamette Valley this year. Seed from those plants will be available to seed growers this fall. Next fall, seed will be available to commercial wheat growers and the first actual crop of Faro will be harvested the following year, 1978.

"We hope to have new material every year to help raise the yields," Rohde said. "We're always looking for new varieties that will help fill our future needs."

# New herbicide controls two old enemies

Willamette Valley wheat growers soon will reap at least $5 million in additional annual income from their crop thanks to research conducted at OSU.

Arnold Appleby, professor of crop science, said a new herbicide tested during the last three years has proven to be effective in controlling wild oats and Italian ryegrass, two major problems affecting western Oregon winter wheat production.

When test plots treated with the new German-developed herbicide were compared to plots treated with the leading herbicide now used commercially, the OSU Experiment Station research group recorded increases of 20 to 40 bushels per acre with the experimental chemical. Tests at six locations last year showed increases of up to 75 bushels per acre.

"We're very excited about this new herbicide," said Appleby. "We've had a long battle against Italian ryegrass, and wild oats—a perennial problem—have been on the increase. Last year was so bad that much potentially good wheat was cut for hay because of weeds."

Full registration of the new herbicide is not expected until 1979 because it still must be approved by the U.S. Environmental Protection Agency. However, Appleby said the herbicide appears to have no major problems that would impede registration.

The new material is in the same toxicity range as 2,4-D, a herbicide used commonly in wheat now. Preliminary studies have shown the material usually is gone after four months. Crops planted the following year have shown no effects of chemical persistence and no herbicide residue has been detected in grain harvested from experimental plots.

But experimentation is not finished at OSU. Because the new herbicide has no effect on broadleaf weeds, Appleby and his associates, Bill Brewster and Robert Spinney, are testing the new material with other herbicides which control broadleaf weeds. Tests aimed at determining how the chemical is affected by weather conditions and how best to apply the herbicide also are being conducted.

Other countries will benefit by using the new herbicide, too. In 1975, it was sold experimentally in Europe and Canada, and full registration is expected in both those areas within the next year. North Africa, New Zealand and Australia —also plagued with wild oat infestations —are other potential markets, the OSU scientist said.

Cost for the herbicide has not been determined, but Appleby said wheat growers should have no problem paying any additional herbicide costs with the increased income derived from improved wheat yields.

"This is an excellent example of what an investment in research can do," Appleby said. "If the additional income growers gain by using this herbicide for just one year were re-invested in agricultural research, we could pay for all of OSU's weed research in all agronomic crops for more than 100 years."

And that would mean a lot more bread for everyone.

WHEAT YIELDS IN BUSHELS PER ACRE

| | LOCATION | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | AVG |
| *HOE 23408 | 124 | 96 | 62 | 128 | 77 | 89 | 96 |
| COMMERCIAL STANDARD | 99 | 21 | 27 | 105 | 76 | 62 | 65 |
| UNTREATED | 50 | 12 | 24 | 100 | 71 | 49 | 51 |
| INCREASE OVER STANDARD Bu/A | 25 | 75 | 35 | 23 | 1 | 27 | 31 |
| VALUE OF INCREASE @ $3.00/Bu | $ 75 | 225 | 105 | 69 | 3 | 81 | $ 93 |
| VALUE OF INCREASE @ $4.50/Bu | $113 | 338 | 158 | 104 | 4 | 122 | $140 |

* HOE 23408 used at 1.0 LB/A Early Postemergence

# Bigger is better . . . in wheat seed

All wheat seeds are not created equal, and OSU agronomist Don Grabe wants to know why.

"Through the years, sporadic attempts have been made to determine whether large seeds of cereals and other crops yield more than small seeds," Grabe said. "Some reports have indicated no difference in performance while others have shown large seeds to be superior. The purpose of our study with wheat is to obtain enough data to determine the effects of seed size under Oregon conditions."

The Agricultural Experiment Station research began in 1973. Grabe collected Hyslop wheat from several locations in wheat-growing areas of the state and sorted the seed lots into two sizes, large and small.

Test plots were established at the Hyslop Farm near Corvallis and at the Columbia Basin Agricultural Research Center's Sherman Station at Moro. When the plots were harvested the following year, yield improvements attributed to seed size were recorded at both sites. (Table 1)

During a second year of testing, seed size was examined more critically. Using screens which sort the seed according to thickness, Grabe divided the seed grain into four size groups and seeded test plots with seeds of similar size. Yields from plots where large seeds were planted also showed increases that year, adding support to Grabe's theory that large seed would produce more grain than small or unsorted seed. (Table 2)

Most growers plant ungraded seed grown in their own fields which means all sizes of seed are mixed together. Grabe believes growers could increase their yield by 3 to 5 bushels per acre if they would plant only the larger seed.

"This represents an added income of as much as $12-20 per acre with little added cost of production. Sizing can be done at the same time as cleaning merely by adding a larger bottom screen. That's almost like having your cake and eating it, too, because the largest seed can be skimmed off and used for superior planting seed while the rest is sold on the market for grain at no reduction in price," he said.

The OSU study raises an important question of whether wheat grown for seed should be grown differently than wheat grown for grain. A small amount of certified wheat grown for seed is now produced in Oregon, but Grabe said it is grown primarily to maintain varietal purity and not for physiological qualities of the seed.

"To some extent, seed quality has been overlooked. We know that when wheat is highly fertilized, the grain appears to make better seed grain. We also know that when plants are crowded together, they produce smaller seed, so maybe if plants are grown further apart they will produce bigger, more productive seed grain. Also, environmental factors such as moisture, humidity and temperature during production of the seed may make a tremendous difference in how seed grain grows," he said.

During the next few years, Grabe and his associates will attempt to answer some questions about the relationship between seed quality and yield potential of wheat.

"An increase of three bushels on every acre of wheat grown in Oregon could make a tremendous difference," he said.

Table 1 Seed Size and Yield of Hyslop Wheat
18 Seed Lots—1974

| Seed Size | Yield (bu/A) | |
|---|---|---|
| | Hyslop Farm | Sherman Station |
| Ungraded | 107.2 | 52.8 |
| Largest half of lot | 110.6 | 54.6 |
| Smallest half of lot | 104.4 | 48.9 |

Table 2 Seed Size and Yield of Hyslop Wheat
9 Lots—Hyslop Farm 1975

| Seed Size | Yield (bu/A) |
|---|---|
| 5-6* | 89.7 |
| 6-6½ | 93.8 |
| 6½-7 | 96.0 |
| Over 7 | 99.6 |
| Ungraded | 94.4 |

* Seed passed through a 6/64 x 3/4 screen but hold on a 5/64 x 3/4, etc.

# Spore tests for NW wheat could open China gates

Biochemist Edward Trione may have found the key to the gates of China for Northwest wheat.

His solution: Several new ways to identify the tiny black spores of TCK fungus (commonly known as dwarf smut), a serious wheat disease.

Since setting a zero tolerance on dwarf smut spores, the People's Republic of China, claiming it does not have TCK fungus, rejects any shipments of wheat containing spores that look like TCK spores.

There is considerable similarity in the external appearance of the spores of dwarf, common and grass smuts (China does have the last two) so it has been difficult to positively identify TCK spores even with a scanning electron microscope.

Wheat infected with TCK fungus does not affect humans but does reduce quality and quantity of wheat yield. When half the shipments of wheat from the Pacific Northwest ports, part of a 1973 sale, were rejected by China because they contained dwarf smut spores, all U.S. wheat to China was sent from the East Coast and Gulf Coast ports. States east of the Rockies do not have the dwarf smut disease.

Trione, a USDA-Agricultural Research Service scientist, worked with B. Bruce Krygier, biological laboratory technician, to develop tests that would give positive identification of TCK spores when only a small sample is available.

"The tests had to be sensitive, rapid and pricise and clearly distinguish TCK spores from common and grass smut spores," said Trione.

"Because the tests had to be good for only 5 to 100 spores, we could rule out conventional chemical analyses of amino acids, carbohydrates, lipids and proteins."

After 10 months, the two scientists came up with five tests to aid in the characterization of TCK spores if 500 or more spores are available.

"But if only 5 to 10 spores are available for study, the analysis is limited to two tests—the negative staining method and the DMSO method—both rapid and precise," said Trione.

In the staining test, a few spores (stained with methylene blue) and a drop of water are mixed with a drop of India ink on a glass slide. Viewed at 1000x magnification, the spores show telltale signs: presence of a capsule, thickness of capsule, length and shape of the spine-like ridges on the outer surface of the spores and their overall diameter.

In the other test, smut spores are put in a small volume of DMSO (dimethylsulfoxide) and stirred. The spores, on a glass slide, are viewed at 400x magnification. The TCK spores remain spherical and normal in appearance. The common and grass smut spores appear collapsed and deformed.

The other three tests involve removal of the spore wall, agglutination or germination.

"However, these tests were based primarily on three different collections of each of the species and there are many collection that we did not test," said Trione. "So this will remain a preliminary report until we gather all the races—5 to 30 depending on species—and test all methods."

With second year funding, Trione plans to gather all races possible of Northwest common, grass and dwarf smuts and test each race by the four chemical tests they have developed, eliminating germination.

"In addition, we also will be studying two highly specific and sensitive new methods," said Trione. "One is the mass spectroscopy method and the other is an immunological method in which antibodies highly specific for each spore type are prepared."

The antibodies are then tagged with a radioactive tracer or fluorescent compound to aid in positive identification of smut spores when only 5 to 10 spores are available.

"Both these new tests probably would be much more specific and sensitive than any of the other methods and neither would take more than two hours," said Trione. "The cost would be reasonable."

All the identification tests, he pointed out, can be used to help identify smut spores of grasses and other cereals in addition to wheat. Grass smut spore identification is important because New Zealand has put a zero tolerance on dwarf smut spores on grass seed and Willamette Valley growers will be required to certify that samples of their seed do not have dwarf smut.

Trione, who has shared his findings with wheat growers of the Northwest, said the identification methods developed can be valuable to seed inspectors and scientists studying smut spores and other similar thick-walled fungal spores.

Whether the identification tests will be accepted by Peking so restrictions against Northwest wheat will be lifted remains a Chinese puzzle.

# work in progress

## Variety show adds 6 new performers

New cast members of the research variety show were announced by Oregon State University this summer.

Linn, a new strawberry variety developed by Francis Lawrence, USDA-Agricultural Research Service horticulturist at OSU, has good potential for mechanical harvesting.

Named for Linn County, the new variety has the firmness, color, crop production, good machine recovery and high percentage of usable ripe fruit from machine picking Lawrence has been searching for during the last 10 years.

"Using the OSU mechanical harvester, the usable ripe fruit from a single harvest in 1974 was 5.3 tons per acre," Lawrence said. "The concentration of crop was good with 90-95 percent of the fruit harvested in two pickings."

For the home gardener, a new pea variety, Corvallis, may soon upstage the standard, Little Marvel. Developed by J. R. Baggett, OSU horticulturist, Corvallis is a bush-type pea that matures a few days later than Little Marvel but may have better table quality.

"Developed primarily for western Oregon, where viruses often limit home garden pea production, Corvallis should be valuable also in areas of Washington and California," Baggett said.

Two new wheat varieties also made their debuts this summer in Oregon and Washington.

Faro, a new white winter club wheat, was developed by Charles Rohde of the Columbia Basin Agricultural Research Center near Pendleton. The new variety, well adapted to lower rainfall areas of eastern Oregon where club wheats commonly are grown, is expected to replace Paha and Moro.

Daws, a fall-seeded winter variety, was developed by USDA-Agricultural Research Service scientists Clarence Peterson and Orville Vogel of Washington State University and released by agricultural experiment stations in Oregon, Washington and Idaho. Daws is expected to replace Nugaines, Hyslop and McDermid in areas where those varieties are prone to winter killing.

The final additions to the Northwest variety show are two new andromeda ("Pieris japonica") developed by Robert Ticknor of the North Willamette Experiment Station.

"Valley Fire, one of the new P. japonicas, makes an interesting landscape plant with relatively large white flowers and brilliant new red growth in the spring," Ticknor said. "Later flushes to new red growth during the summer make the plant appear to be in bloom."

Valley Valentine, the other new variety, has potential as a potted plant for Valentine's Day, Ticknor said.

All new varieties will spend some time in stock production, before going on the road for commercial sale.

## Pigeon banding project shows a new profit

A bird in the hand may be leading OSU wildlife scientists to a better understanding of birds in the bush.

But getting those birds—band-tailed pigeons—into the hands of researchers can present problems, as a handful of scientists working with wildlife ecologist Robert L. Jarvis again discovered this summer.

Near Corvallis, a bird-banding crew led by Jarvis and wildlife graduate student Mike Passmore, set out a large nylon net on the ground near bird feet. Attached to the net were three special rockets. When all gear was in place, the crew retired to a nearby blind to get a bird's-eye view of the feeding area. When enough birds—often more than a hundred—congregated to feed, the rockets were fired. The banding crew then bagged, weighed, measured and put metal U.S. Fish and Wildlife Service tags on the birds' legs. Birds then were released unharmed.

*Band-tailed pigeon*

Since 1965, Agricultural Experiment Station researchers at OSU have studied the game birds, but interest in the project was renewed last year when the Oregon Department of Fish and Wildlife changed the bag limit from eight to five birds. Wildlife officials were concerned because pigeon population apparently was declining. California and Washington also cut bag limits.

"We plan to continue banding and collecting data about band-tailed pigeons for several years to see if any changes in overall mortality and survival occur," Jarvis said.

Found in Oregon from the crest of the Cascades to the Pacific Ocean, with a few occasionally sighted in eastern Oregon, the band-tail—bluish gray with a dark band across the

rounded gray tail—is protected by the Migratory Bird Treaty Act and cannot be sold commercially for food.

Tagging ended in August and by mid-September birds migrate south, spreading through California but preferring the Monterey area.

But next year the birds will return, and so will the researchers.

## DMSO a hit with Oregon's veterinarians

DMSO has gone to the dogs—apparently with a great deal of success.

It also has gone to cats, horses and cattle with equal success, an Oregon State University researcher found.

Loren Koller, a veterinary pathologist in OSU's School of Veterinary Medicine, recently surveyed 1,000 veterinarians in Oregon and Washington to find out how they were using the drug to treat their animal patients.

DMSO, or dimethyl sulfoxide, was banned from human use in 1965 because it was suspected of causing lens changes in the eyes of test mammals. However, some experimentation continued, and in 1970, DMSO was approved for veterinary use on animals.

One hundred veterinarians responded to Koller's survey, which was sponsored by the Oregon Agricultural Experiment Station.

The majority used the drug moderately and a few made wide use of it. Six veterinarians said they did not use the drug at all and only two others said they made limited use of DMSO.

"DMSO was used most often to reduce soft-tissue swelling and inflamation resulting from acute trauma," Koller said. "Response to treatment in these cases was considered excellent."

Most often, DMSO was given topically—on the skin—and frequently other drugs were used with DMSO. Koller said one of the main advantages of DMSO is its ability to carry other drugs to tissues, and some physicians have said DMSO may represent a "new principle of medicine" because of that ability.

However, Koller also found it was not unusual for DMSO to be given intravenously especially to horses and cattle.

"In horses, DMSO was used to treat acute lameness, wire cuts, other trauma and pneumonia," he said.

In cattle, some outstanding recoveries were reported. One veterinarian said calves—in comas as a result of severe diarrhea—were up the next day after an intravenous treatment of DMSO and another drug.

But the controversial drug was not whole-heartedly endorsed by the veterinarians who responded to Koller's survey.

Many stated they used the drug only as a last resort and said they did not consider it a "wonder" drug. Others complained bitterly about being approached to supply the drug illegally for human use. One veterinarian wrote, "get the pressure off veterinarians to supply (DMSO) to the public."

But despite some opposition, Koller thinks DMSO will continue to be used, especially if the drug's capacity to carry other drugs into tissues is proven and explored.

"DMSO appears to have a place in veterinary medicine," he said.

## Public to test new whey wine

Good taste from waste.

That's what Foremost Foods Company of California is hoping taste testers will discover when they sample the company's experimental whey wine.

But the idea of making wine from whey is nothing new to Oregon residents because the process was developed at OSU by food technologist Hoya Yang.

*Hoya Yang shows his wine.*

Nine pounds of whey are left over from every pound of cheese, and several years ago, the U.S. Environmental Protection Agency approached Yang about finding a use for the wasted whey. New laws, which will go into effect in 1977, require cheese producers to utilize whey without discharging it into sewer systems. Now, approximately 17 billion pounds of fluid whey are used as dairy solids in ice cream, cake mixes, dairy toppings, sauces and other products, and an estimated 13 billion pounds are discarded into sewer systems.

The EPA gave Foremost a grant of $113,631 to test Yang's invention on a commercial scale. At its pilot processing plant in Dublin, California, Foremost is experimenting with different flavors to enhance the wine for consumer taste buds. Plum and two berry flavors are being considered.

Next, small groups will test the whey wine, and if they think the wine tastes good, 500 persons in the San Francisco Bay area will sample the

new product. If all goes well with that test, additional tests will be conducted in the Los Angeles area. If whey wine passes all tests, it will appear on the market shelves.

With luck, whey wine will soon be on its way.

## Growers have new designs on greenhouses

New light has been shed on an appropriate subject—the greenhouse.

"Worldwide food shortages, higher energy costs and unpredictable weather conditions all have contributed to greater interest in greenhouses," said Oregon State University agricultural engineer Marty Hellickson.

He has been studying heat loss characteristics of greenhouse shapes and construction materials. The research was instituted to explore the feasibility of geothermally heated greenhouses in the Klamath Falls area. But the results are appropriate for other areas and other heat sources.

Two structural designs were considered—gabled roof and arched roof. Several types of covering materials were investigated including polyethylene plastic, glass, corrugated fiberglass and flat fiberglass.

Because heat loss is directly related to the surface area of the greenhouse, the gabled roof design proved to be more efficient than the arched roof design. An arched roof, covering the same square feet of floor space as a gabled roof, has approximately 14 percent more surface area.

Results of the heat loss calculations for the structure, based on covering material, showed double-layer polyethylene with an air space between the layers lost the least amount of heat per square foot of floor space. It was followed by flat fiberglass, glass, single layer polyethylene and in last place, corrugated fiberglass. Corrugated fiberglass lost more heat per square foot of floor area because surface area was increased by the corrugations. Depending upon the depth and shape of the corrugations, the surface area exposed may be 18 percent more than if a flat surface material is used.

The final tabulations showed the most efficient greenhouse in terms of heat loss to be one with a gabled roof design and constructed with double-layer polyethylene plastic walls and roof.

Research is continuing at OSU to determine the overall economic efficiency of greenhouse construction.

## Sheep to try new feed straw

Oregon State University microbiologist Arthur Anderson is trying to spin grass straw into gold.

Gold in the form of a high-grade livestock feed, that is.

Armed with $200,000 in grants from the National Science Foundation and the U.S. Department of Agriculture, Anderson and USDA microbiologist Y. W. Han have worked five years to perfect a system of converting fine-milled grass straw into a high-grade feed equal to alfalfa in nutritive value.

Until now, grass straw has been considered a relatively poor livestock feed because straw cellulose—or sugars—are chemically trapped inside straw fibers.

Anderson and Han have overcome the problem of trapped sugars by subjecting straw to a mild acid bath in a machine called a digester. After straw fibers have been hydrolized and neutralized inside the digester, they are cooled and yeast and nitrogen are added. The yeast grows rapidly and converts into protein and fat.

"Within 24-36 hours, the straw has a sweet, molasses-like odor and a much higher nutritive value," said Anderson, an Agricultural Experiment Station scientist.

The proof of the project will come this fall, however, when feeding trials begin. Sheep will be the first animals to try the new feed, but later, cattle, hogs, horses and chickens may get a taste of the new feed.

*Arthur Anderson inspects digester which converts fine-milled grass straw into high-grade feed.*

# Quick action on chemical saves money for growers

An exemption for the State of Oregon to use the fungicide Benlate on wheat may have saved wheat growers in six counties $2 million this year.

Benlate controls Cercosporella foot rot, a fungus which occurs every year to some extent. Oregon's last big epidemic was in 1963 when wheat production was reduced heavily.

OSU plant pathologist Robert Powelson said evidence began mounting in November which led him to believe the potential for a Cercosporella foot rot epidemic in Gilliam, Morrow, Sherman, Umatilla, Union and Wasco counties was as great for 1976 as it had been in 1963.

"It all started in November when Extension agent Gordon Cook brought in some suspicious plants from Sherman County. The mild winter had been ideal for growth of lesions and susceptibility to the fungus increases with age," Powelson said.

Cercosporella foot rot, linked to early seeding, may survive in crop residues for two or more years. Under cool and wet conditions, spores produced from infected stubble are splashed onto the base of wheat plants where infection occurs.

Earlier research by Powelson, an Experiment Station researcher, had shown Benlate, when properly applied, almost totally controlled Cercosporella foot rot. But DuPont, which makes the chemical, had never applied to the U.S. Environmental Protection Agency for a wheat usage permit because of the sporadic need for control. Benlate had been approved for use on many other crops (strawberries and other fruits), however.

A team headed by Powelson: Tom Harrison, Oregon Department of Agriculture supervisor for feed, fertilizer and pesticide programs, and Wesley Grilley, executive president of the Oregon Wheat Growers League, began preparing documentation, hoping to get approval from the EPA for a conditional Benlate use permit.

With advice and information from Sen. Mark Hatfield's office and from DuPont, the team was able to obtain a one application only permit from EPA in a record-breaking time of three days.

Meetings were held in The Dalles and Pendleton to inform growers, chemical companies and applicators about Benlate. The chemical costs $9.50 per pound, which covers one acre. It can be applied from the ground or by plane. In earlier meetings headed by OSU Extension agronomist Norm Goetze, growers had learned what the disease was and how it threatened their crops.

"The growers had to decide whether it would pay," Powelson said. "Their decisions were based on whether the field had a history of crop loss caused by Cercosporella foot rot and whether the field had been seeded before September 20."

By next year, DuPont is expected to get permanent approval for use of Benlate on wheat, eliminating a major problem for wheat growers who like to seed early.

For Powelson, research will continue on Cercosporella foot rot. More knowledge of the factors affecting disease resistance and crop losses and better means of early identification may help boot Cercosporella foot rot off Oregon farms for good.



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