Oregon's Agricultural
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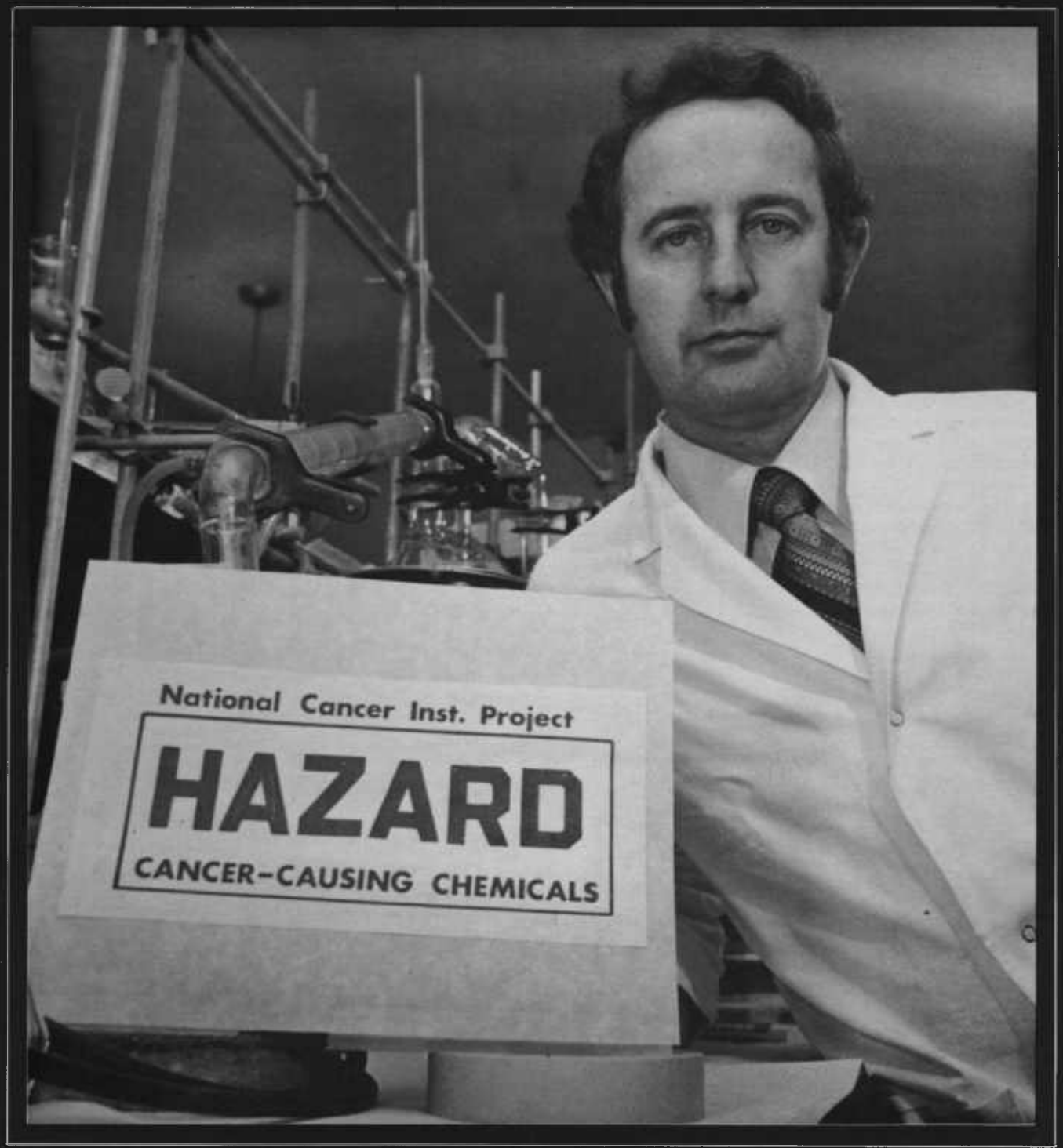

Agricultural Experiment Station
Oregon State University

comment

Director John R. Davis

Truth . . . or consequences

Land Grant universities such as Oregon State University are indeed unique institutions. Within their main purposes of teaching, research and public service, these institutions have earned a renowned reputation for responding to public needs, for honesty and integrity and for high quality. Land Grant universities are public universities and, as such, supported primarily by public funds. They are subject to public scrutiny and accountability and responsible to an elected or appointed governing board and the legislature of the state. Everything they do is open to the public, and their faculties are encouraged to publish all of their research findings in reviewed journals.

In spite of this, some people have attempted to discredit OSU, mainly because they disagree with the research findings or the statements of its faculty. Being criticized for programs we cannot undertake is normal, for we work with limited resources that simply do not allow research or teaching programs to serve all interests. But the criticism leveled at universities because the work of our scientists, or the actions of our students, do not agree with the policies of a group of individuals is unfair and inaccurate, and the strategies used to present such criticisms are often dishonest.

Specifically, the University has been criticized for conducting research on agricultural chemicals and for releasing its findings about the effect of chemical usage in agriculture to the public. Those attempting to question research results—often for purposes not in the public interest—state that our research is funded by industry, especially the chemical industry. Because we are captives of the chemical industry, state our detractors, our research is biased and should be discounted.

Let's look at the truths behind this issue of university-industry relations. First, our research is not supported by industry to any appreciable extent, as shown by these figures:

- The total 1979-80 Agricultural Experiment Station budget is $14,132,006.
- The total industry support of this budget is about $156,000.
- The total chemical industry part of the budget is about $74,000.

Conclusion: Chemical industry support of the Agricultural Experiment Station amounts to about ½ of 1 percent of the state-approved budget.

The Agricultural Experiment Station also receives a number of gifts, grants and contracts from state and federal agencies and from industry, in addition to the budget mentioned above. Close examination of the records of all sources of this income reveals an additional $99,000 from chemical companies in 1979-80 for support of research on fertilizers, pharmaceuticals, plant growth regulators, feed supplements, herbicides, insecticides, fungicides, food safety and other topics.

These total amounts of about $74,000 and $99,000 (out of a budget of more than $14 million and grants and contracts of approximately $5 million per year) hardly qualify as a dominating force in our program—they total less than 1 percent of our entire program. Those detractors who claim we are run by the chemical companies because the majority of our funds come from these companies, therefore, are grossly incorrect and dishonest. These audited figures are available to anyone, and the only reason the detractors make such statements is to try to prove their own personal viewpoint, even if it means stretching the truth.

Let's look at another criticism of the University—that of doing any research sponsored by industry. Why, some ask, should the Agricultural Experiment Station undertake any research for industry? Certainly the results will be biased! This statement is obviously based on the assumption that industry is bad and that faculty of the University will publish incorrect data and conclusions. I soundly reject both these assumptions; we cannot exist as a free democracy without industry, and faculty publication is subject to peer scientist review and professional evaluation at all times.

The partnership of state-federal-private support of research is well understood and accepted by all state governments. Without this partnership, agricultural research, farm production and our quality of life simply would not be what it is today. Think about it—between industry and public services, the only sector that creates real wealth is industry. It foots the bill to pay for our public services.

Oregonians should be aware that agriculture in general and the Agricultural Experiment Station specifically are under fire from detractors who will tell the big lie often enough and to enough people so that soon it becomes believable. The public will pay the price, though, in higher food costs, lower food quality and generally lower economic conditions. Discrediting a university by such tactics is dishonest and disreputable; it is really a form of book burning and certainly a disservice to the people of Oregon.

We are ready anytime to face a challenge to research findings on scientific grounds. But facing a challenge on political grounds, because of persons with their own ax to grind, is not easy. It will require public understanding and an alert, informed public.

So don't get taken in by those persons who attempt to dishonor a public university just to further their own interests. Instead, demand good, hard facts and scientific proof of high quality—then analyze the issues clearly and accurately. Only then will politics function well. Remember, a public university is accountable to the public and is your university. If you don't believe in it, I hope you have a good religion, because there won't be much left in which to believe. Ralph Barton Perry said it well: "I prefer credulity to skepticism and cynicism, for there is more promise in almost anything than in nothing at all." ■

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Experiment Station Communications

Andy Duncan, Assistant Editor
Editor, Oregon's Agricultural Progress

Dave King, Assistant Editor

Susan Irish, Designer

Cover: A firing process used to produce some dried foods is heating up Richard Scanlan's cancer-related research. See story, Page 7. (Photo: Dave King.)

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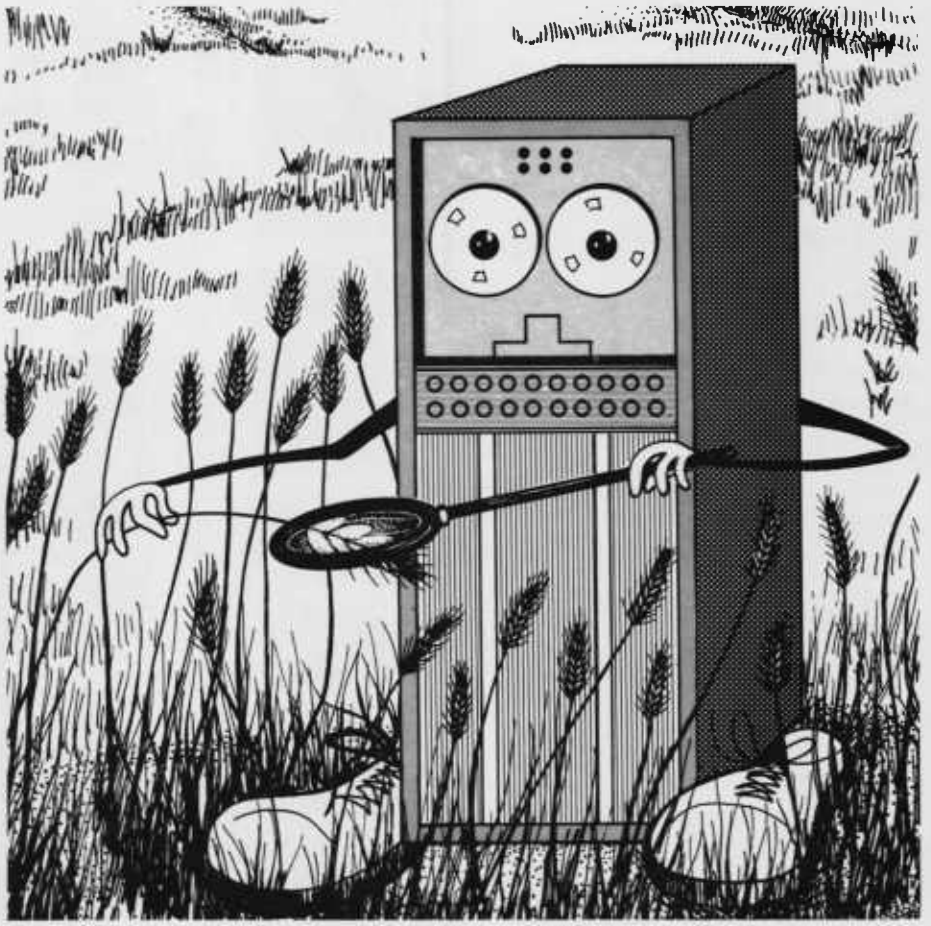
GRAIN



Plant physiologist Betty Klepper (above, left) and soil scientist Ron Rickman (left) hope computers can help wheat farmers with "the fine points."

BRAIN

Will a computer be wheat farmer's next hired hand?

Two scientists at OSU's Columbia Basin Agricultural Research Center near Pendleton hope their sweeping study of how wheat grows is contributing to the day—early in the 1980s—when an Oregon grain farmer will plod home from the field to finish the day's work by the light of a computer.

Why such a goal?

"Any good farmer can look at a field of wheat, analyze the conditions and know generally what to do," said soil scientist Ron Rickman, who is working on the study with fellow U.S. Department of Agriculture researcher Betty Klepper.

"The computer program we're developing will help with the details, the fine points that mean dollars and cents year in and year out."

An example of a problem the computer could help solve arose in November of 1978, he said. An unseasonable cold snap struck the Pendleton area as winter wheat (planted in early fall) was emerging from the ground.

Farmers knew the young wheat probably was damaged, but they didn't realize until months later the extent of the damage. They had to plant spring wheat to get a full crop.

"In that situation the program would have allowed them to feed the temperatures into a computer and get a fairly precise idea of what damage to expect in the spring," said Rickman.

"With the information in hand in November, they could have prepared during the winter to plant spring wheat. Or, they could have gone out in early winter and replanted winter wheat to compensate for the losses. It would have removed the guesswork."

If such computer services do become available, they will be a payoff for the breaking of new ground in wheat research, points out Klepper, the only plant physiologist in USDA studying wheat with what she calls a "whole plant" approach.

"Farmers know a hot, dry June will shrivel the grain. They know a hard winter will kill the plants," she said. "But we have to understand what's happening in all of the plant during all stages in its life cycle to develop a model that can identify the sensitive influences on yield we'd like to be able to predict.

"One of the main things we are accomplishing is learning to break wheat down into manageable packages for the computer model."

The key to that, she said, appears to be the "tillers"—branch shoots that grow out of the base of the wheat plant and are the life support lines for the stalks, or heads, that bear grain.

"Right now," said Klepper, "the best way to predict yield is by the total amount of standing dry matter in a field at the time of pollination. We hope looking at populations of tillers, and knowing how they will react to the weather and other factors at various growth stages, will give us a more precise prediction method."

But getting a "handle" on all that must go into a wheat prediction model is more complicated than some might think, according to Rickman.

"On any given day a weather change—unusual heat, for example—can have different effects on different tillers," he said. That is because they grow out of the plant at different times and are always at different stages in their lives.

There are many other perplexing questions, some involving intricately woven patterns of plant response to environmental and other conditions, Rickman and Klepper are trying to answer. A couple of examples:

- Each tiller has its own root system for obtaining nutrients and water. But a "signal" within the plant tells some tillers to die during the crop cycle. Understanding what triggers the death message could

By the time he and Betty Klepper finish their work, farmers will be able to buy a "suitable computer" for less than $1,000, predicts Ron Rickman.

lead to a strategy for keeping the tillers alive, increasing yield.

• The wheat stubble some farmers burn after harvest apparently could be left to return nutrients to the soil, help the soil retain moisture and curb erosion. But the stubble also keeps the soil colder during the winter, retarding growth. Which practice is wiser?

Another big job ahead of the researchers is gathering information from economists so their computer program will be able to answer "bottom line" questions such as what is a farmer losing or gaining in dollars from a situation or action.

Also, they are working solely with the Stevens variety of wheat developed at OSU and the computer model will have to be modified for other varieties.

Filling in the pieces of the puzzle is a slow process, said Rickman, who started the work more than 10 years ago. But he said he and Klepper, who joined the project last year, are on schedule.

"We want to get all the information stuffed into the machine in 1980. Field tests will come in 1981 and a re-check in 1982. In 1983, we plan to make presentations about the computer program to Extension agents around the state."

Rickman speculated that, initially, many farmers will go to the agents—who will have access to a computer—for answers to their questions.

"Say you've had an insect infestation. You could go to an agent and say, 'Here are my conditions. Now, what's the probable damage?' "

But some will want their answers right away, he said, and they will be able to get them.

"By the time this program is completed, I believe the average farmer will be able to buy a suitable computer for less than $1,000," said Rickman. "In Kansas and other states they already use those programmable pocket calculators to come up with water requirement estimates for corn.

"A farmer is playing a betting game at certain times of the year that will make or break him come harvest," he added. "They need that extra information at betting time." ■

Consulting a computer early in the year could pay off at harvest time, the Columbia Basin researchers believe.

The Nitrosamine Questions?

What foods are they in? How did they get there? How threatening are they? Can they be eliminated? An OSU researcher is busy seeking answers.

Richard Scanlan, an OSU food scientist, raises research questions the way some of us raise tomatoes.

These days he is raising questions about a heating process he suspects triggers the formation of cancer-promoting substances in some dried foods.

A little background information:

For several years Scanlan has studied a type of nitrosamine, a member of a group of chemical compounds linked to cancer in tests with animals (see accompanying articles for more information), that has been detected in products such as bacon and other cured meats, scotch whiskey and beer.

"We suppose that if the direct fired process can produce nitrosamines in malt, it can do the same in other foods," says researcher Richard Scanlan.

Last spring, he collaborated with the malt and brewing industries in an attempt to lower the level of the nitrosamine in beer. His effort was a success; he and industry researchers lowered the nitrosamine level. But for Scanlan, the work raised more questions.

Like researchers in Europe and elsewhere, he found the nitrosamine appeared when a "direct fired process," utilizing an open gas flame similar to the flame from a Bunsen burner, was used to dry malt (a beer ingredient). Scanlan's thoughts—and research—turned to foods sometimes dried that way.

What has he learned?

"The status of our work is this," he said. "We suppose that if the direct fired process can produce nitrosamines in malt, it can do the same in other dried foods. But that still has to be established."

Cautious like many researchers who think their work could have far-reaching impact, Scanlan said he prefers not to risk allowing some food products to become "guilty by association," or the public to be needlessly alarmed, by discussing his dried food research until the results are reviewed by fellow scientists.

But regardless of the outcome, with the dried food study the Experiment Station scientist is plunging further into new research territory he entered when he switched his focus from cured meat to beer.

He explained that in cured meat, bacon for example, nitrosamines can be formed by a chemical reaction when an agent such as the food additive nitrite, put into the meat to prevent deadly botulism and other spoilage problems, combines during cooking with naturally occurring substances called amines (present in most foods).

"Until recently, most of the research was with cured meats," Scanlan said. "But when reports started arriving from the German Cancer Research Center in Heidelberg that German beers contained nitrosamines, the picture changed."

He said with beer (more precisely the malt in beer), instead of a food

additive combining with an amine, combustion products called oxides of nitrogen were combining with the naturally occurring amine to form a nitrosamine.

Scanlan was one of the first to look for the compound in American beer.

After he had tested several brands from off the grocery shelf in Corvallis, and discovered to no one's surprise most of them contained the nitrosamine, he was contacted by a Northwest malting company that serves many western breweries. If its malt contained nitrosamines, the company wanted to eliminate them.

Joint research with the company led to a partial—and relatively simple—solution to the problem.

"Years back," Scanlan explained, "maltsters used sulfur in the malt drying process because it was thought that sulfur dioxide gas increased the solubility of the protein in the malt. We found it decreased the nitrosamine content."

The research showed that using sulfur in the drying lowered the nitrosamine level in malt from 60 to 70 parts per billion to about two to three parts per billion.

The ultimate goal of Scanlan's continuing work with beer is to block entirely the formation of the nitrosamine. He hopes "a little perfecting" of the sulfur drying process at least will reduce the nitrosamine level further. And the work could have broader impact. Several other common food products (including scotch whiskey, known to contain nitrosamines) contain malt.

A review of Scanlan's research record is reason for optimism.

In 1969, he began to develop a dependable analytical method of detecting extremely low nitrosamine levels. Last year, he completed work which enables him to confirm the existence of nitrosamines down to a part per billion (previously, levels below 10 parts per billion could not be confirmed). He uses a mass spectrometer—an instrument that breaks down molecules to identify a substance—for the confirmation.

And he uses the word "confirmation" carefully, because he has learned to use another laboratory device, the Thermal Energy Analyzer or "TEA," to detect a nitrosamine level of one tenth of a part per billion. Unfortunately, the TEA sometimes produces false positive readings (creating the need for confirmation).

Ironically, the technological leaps, the increasing ability of Scanlan and other scientists to detect smaller and

Scanlan and research assistant Jim Barbour (above, left) use sophisticated laboratory equipment to detect the chemical compounds in foods and beverages. At right, the researchers examine a malt sample. They helped lower the nitrosamine level in beer.

What's a 'part per'?

To understand almost anything, you need a frame of reference.

So it is with nitrosamine research.

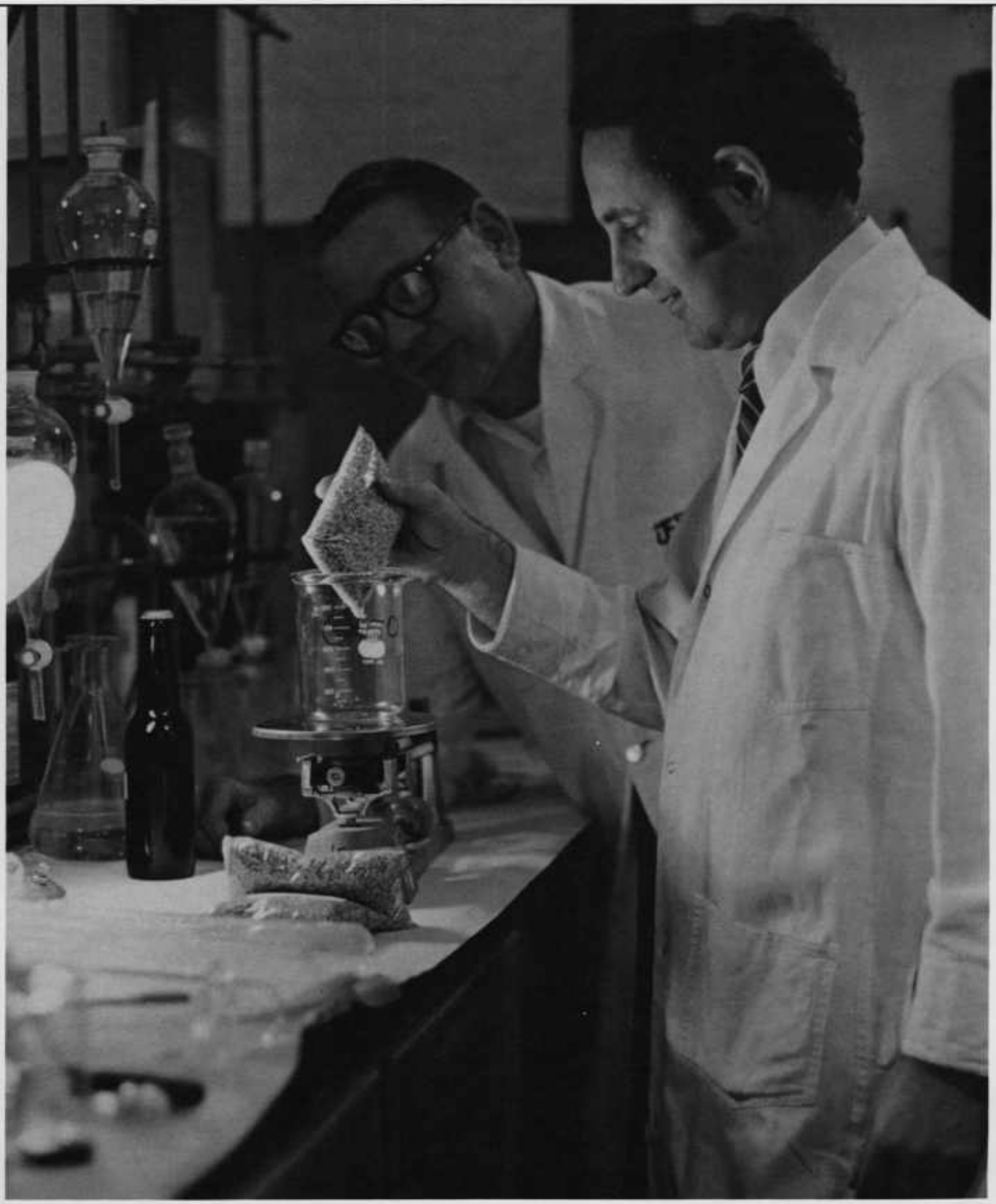
Scientists often speak of the quantity of nitrosamines detected in foods in terms of the number of "parts per million" or "parts per billion." But what does that mean (and what is its significance)?

It helps to consider the concepts in a familiar framework. Use time, for example. One second in 11½ days is a part per million concentration (roughly speaking). One second in 32 years is a part per billion concentration.

"In foods where nitrosamines have been detected so far," says Richard Scanlan, "levels usually are in the one to 20 parts per billion range."

By comparison, he says, in standard animal feeding tests with nitrosamines, the lowest level that has resulted in a "significant incidence of cancer" is in the lower parts per million range—about a thousand fold higher concentration than that detected in bacon, beer and elsewhere.

The problem now, as Scanlan explains in the accompanying articles, is interpreting what the animal tests mean in terms of human health. ■



smaller amounts of substances that may threaten human health, worry the OSU researcher, especially when he looks to the future. He is concerned about consumers becoming confused.

"Environmental toxicology is a young field," said Scanlan, "and, unfortunately, I believe we're going to uncover more and more of these possible hazards as the science becomes more precise. We are just beginning to take a critical look at many synthetic chemicals and compounds introduced into our lives in the last 40 years or so.

"That isn't to say all, or even most, synthetic chemicals cause cancer. But we have to study them, to find out which do and which don't. The initial use of many of them was based solely on their effectiveness and cost."

Scanlan said he doesn't envy the persons at regulatory agencies, and in private industry, who must take basic and medical research information and make "hard decisions" about which substances are safe and which aren't.

"Look at cured meats," he said. "We find that nitrite, a food additive widely used for years, can lead to the formation of cancer-causing compounds. That's bad. But the other side isn't much rosier, because if you remove the nitrite more outbreaks of botulism probably will occur. I guess that means we still have a lot of work to do in the laboratory." ■

A scientist discusses 'the biggest fallacy'

Does just about everything we put in our bodies cause cancer in laboratory animals?

It may seem that way, especially if a researcher throws up another warning flag just when you thought it was safe to go back into the refrigerator. But the answer is an emphatic no, says Richard Scanlan.

The OSU scientist, who is in the frontline of efforts to detect, analyze and eliminate cancer-causing substances and is studying compounds called nitrosamines, relishes the chance to discuss what he considers an alarmingly widespread notion.

"The biggest fallacy bantered around today is that everything causes cancer," he says. "We find many of the compounds that are tested don't cause cancer. In fact, many more don't than do."

To back up his statement, Scanlan cites Environmental Protection Agency figures: Out of about 7,000 compounds examined, only about 500 (roughly 7 percent) were found to contain substances that cause cancer in animals. He mentions National Cancer Institute studies of more than 200 compounds thought to be potent cancer causers. About half were not, it turned out.

You get the idea the topic is often on his mind. You are right.

"I get calls when anything comes up about nitrosamines," he says, "even though we do little work with their effects—we're studying how they are formed chemically and how they can be detected. That's one reason I monitor work done elsewhere.

"I know nitrosamines are a potent group of cancer-causing compounds, based on feeding them to a wide range of animals—rats, monkeys, guinea pigs and so on."

But Scanlan says one of the most frustrating debates in cancer-related nitrosamine research rages around those feeding tests.

"The $64,000 question in all of this," he says, "is: Are the small amounts of nitrosamines in bacon and beer and elsewhere enough to cause cancer in humans? I'd have to say the answer is unknown."

The hitch, he explains, is trying to apply the results from experiments in which small groups of animals are fed large amounts of nitrosamines to the millions of humans exposed to trace levels through foods and other sources.

"It just cannot be done at this point," he says. "It's like trying to use a machine that measures red light to measure blue light."

Why not clear up the matter by feeding trace amounts of nitrosamines to large numbers of animals. There is a "numbers" problem, says Scanlan.

Think of it this way: There might not be a single tumor in an experiment with 100 rats (a feasible test size) fed traces of nitrosamines. But if scientists could work with a million rats (an impossible undertaking at this time), the statistical chance of testing some that were sensitive to low levels would increase. And when you consider that there are about 220 million Americans, you realize a mere one percent rise in the tumor rate would signal danger to 2.2 million people.

The less-than-perfect alternative, of course, is to feed test animals larger amounts of the substances than may be found in the environment.

The practice has generated confusion and controversy which has spilled into the public arena. Some say humans would have to consume huge quantities of foods containing nitrosamines to suffer ill effects. Others disagree.

Scanlan sums up the debate, observing that the gap between animals and humans in cancer research is a "never, never land" yet to be bridged.

"But I'm confident that day will come; we'll see a breakthrough in interpreting these animal experiments," he says. ■

Porter Lombard

A ripe idea BLOSSOMS in Medford

Porter Lombard's hedgerows are bearing fruit.

That is not surprising because they are pear trees. The OSU horticulturist, superintendent of the Southern Oregon Agricultural Experiment Station at Medford, is experimenting with what he believes may be the orchard design of the future.

"With proper management I think it is very promising. We have orchards in this area 50 years old that aren't producing what our young (seven-year-old) hedgerows are," he said.

But the OSU scientist does not take all the credit. He said the idea of planting fruit trees close together surfaced in Europe in the 1950s—a product of more cramped agricultural conditions—and was first examined by OSU researchers at the Lewis-Brown Farm near Corvallis.

Lombard began experimenting with hedgerows in Southern Oregon's Rogue River Valley 12 years ago. Today, some of his test orchards contain more than 700 trees per acre, compared to about 70 an acre in many old pear orchards in the area.

In the experimental plots, the spreading, gnarled look of old trees stretching their limbs in many directions to collect sunlight has given way to a uniform scene of tightly spaced, neatly pruned rows of trees (most are 5½ feet apart with 12 feet between rows) with single trunks. They bring to mind a Christmas tree farm.

What hedgerow orchards can bring to growers' pocketbooks interests Lombard.

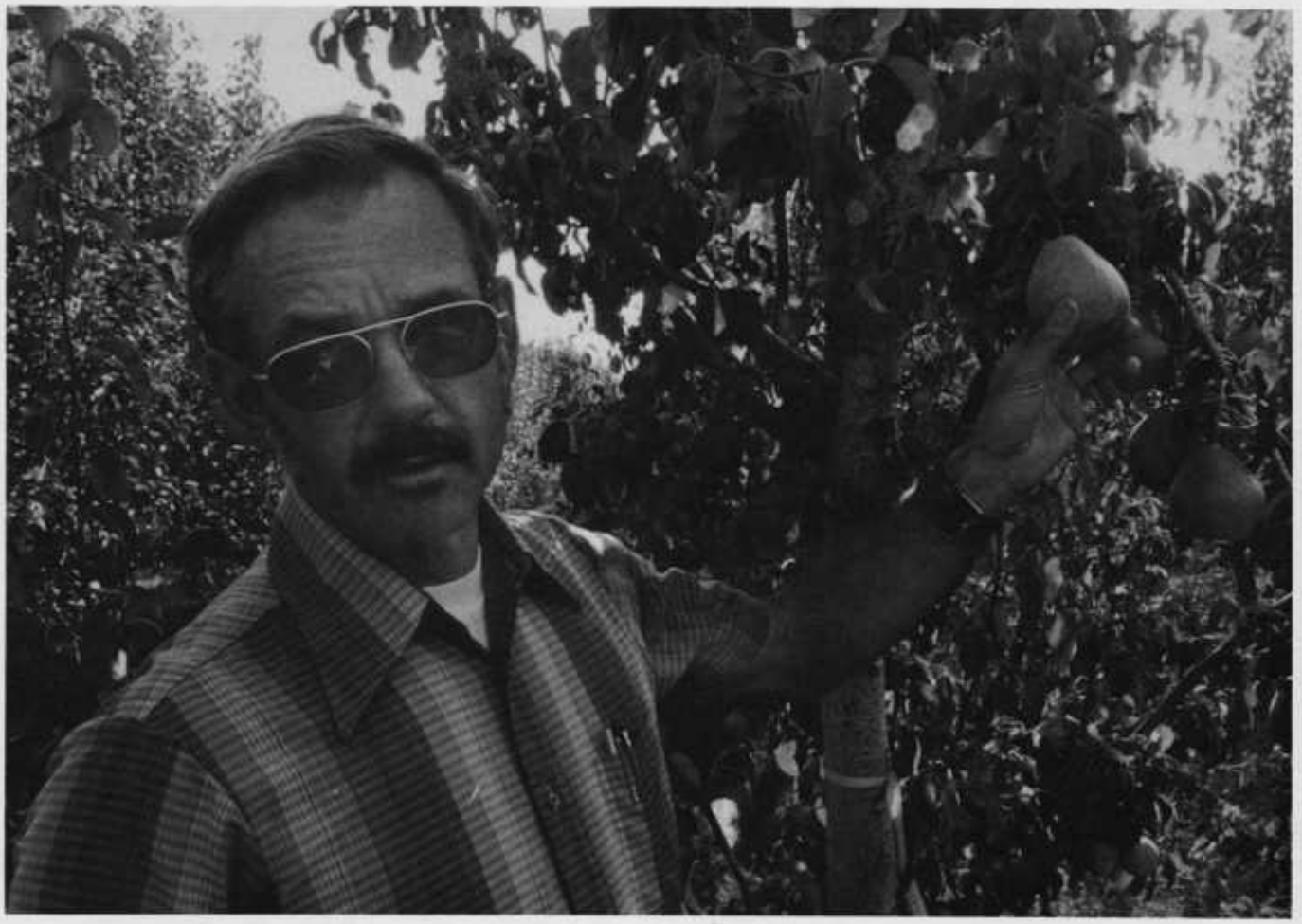
He said the reason for using the technique is simple: The outer two feet of a pear tree limb receives most of the sunlight and is the "bearing surface" that produces fruit.

"Why waste space and time growing long limbs," he said. "We try to get the bearing surface area filled out as quickly as possible, then prune the sides and top."

Lombard estimates that by planting eight to 10 times as many trees he has been able to produce up to 2½ times as many pears as he could on an acre of conventional orchard land. He said last year Experiment Station personnel harvested more than 25 tons of pears an acre from hedgerow plots. Most conventional orchards peak at about 15 tons per acre and average about 10 tons per acre.

In addition, he said, with the hedgerow approach an orchard can reach full production level in seven to nine years. Conventionally planted orchards, with trees 25 or so feet apart, usually reach full production (although producing fewer tons per acre) in 20 to 25 years.

Lombard is quick to point out that careful planning and hard work are as much keys to the success of



Lombard has more than doubled pear yields with experimental hedgerow orchard plots.

hedgerow orchards as the design, and that "problems are lurking down the road" for growers with one-track minds.

"We've been trying to make the point that you have to use a systems approach, you have to think through every step in advance, to increase production," he said. "Each decision affects the other."

His examples of related planning decisions:

- Tree spacing—What it should be depends on the tree variety and type of rootstock, the harvesting technique to be used and other factors.
- Row orientation—North-south rows get better sun exposure and produce more pears. But prevailing wind direction, possible "frost pockets" in sloped areas and the size and type of equipment to be used to maintain an orchard affect how rows should be oriented.
- Frost protection—No choice here. Lombard has found that sprinkler frost protection systems work well with hedgerows. Oil heaters are difficult to use because of the tight tree spacing.

He said commercial growers still "get pretty nervous" about the idea of hedgerows, wondering how they will get their maintenance and harvesting equipment into the orchards, or about the extra cost of planting more trees. But several have modified the Station technique, planting trees in rows about eight feet apart with 14 feet or so between rows. He thinks attitudes will continue to change with the realization that pre-planning can eliminate problems.

"Besides," he said, "just one year's earnings from a hedgerow orchard that produces early can pay for the worry—and the cost of those extra trees." ■

Fish powder promises pinches of protein

You doubt whether Duncan Law will dazzle many gourmets (he suggests adding a pinch of fish to everything from tamales to noodles).

He may help feed the world's hungry.

Law, a researcher at the OSU Seafoods Laboratory at Astoria, has spearheaded development of a protein concentrate that uses almost every part of a fish, has little taste or odor and can be added to flour and other foods—and beverages—to increase their protein content.

The concentrate looks so promising a Mexican fish processing company, Pesquera Del Pacifico of Ensenada, and an Oregon company, Oceans Best, Inc. (set up primarily for the joint venture), are outfitting a pilot plant in Astoria to test its commercial potential.

The optimism of the firms' leaders, who have given 2 percent of the stock of the project to OSU, is shared by Law, who will represent OSU as an adviser and consultant at the pilot plant.

"Of course every researcher hopes and dreams some of his work will take off on its own and really help people," said the Agricultural Experiment Station food scientist, who conducted the research with David Crawford, head of the seafoods lab, and other members of the lab staff. ". . . We are proud of this. We hope it will be an important food adjunct, especially for the 'Third World' countries."

Answers will begin arriving soon. The pilot plant is scheduled to be completed next spring to take advantage of the April-to-October hake fishing season off the Oregon coast.

The goal will be to convert hake—a plentiful ocean resource not widely sought by U.S. fishermen—to to fine white powder that looks like flour and contains 80 to 90 percent protein.

"The process uses the whole fish, which means there would be no waste problem in a commercial factory," said Law. "Most of the bones are extracted and can be used in fertilizers or animal feeds. The extracted oil has many uses, including soaps and animal feeds.

Duncan Law demonstrates protein concentrate's solubility.

The rest of the fish goes into the concentrate."

Law said he and his colleagues were working on developing a food for fish when the idea for a fish protein concentrate came.

"We were pasteurizing fish to kill harmful bacteria when we discovered that by heating we could liquefy some of the fish products," he said. "We found, too, that the bones could be removed and through another process we could remove oil, leaving a product, after spray drying, that was a powder, a potential product for human consumption."

Such concentrates are not new, he said. But others have not gained popularity principally because they were not versatile enough—they smelled bad and altered the foods they were added to.

'That is the beauty of this (concentrate)," said Law. "You can add the concentrate to the food of any country without changing it. I think too many times we try to force our food on other cultures—just like when a mom tells her kid, 'eat this vitamin, it's good for you.' "

The researcher, who has spent 35 years at the Astoria laboratory trying to find new ways to use the sea's food resources, said if the pilot plant is successful, the concentrate could create business for the Oregon fishing industry, as well as benefiting people and industry in other areas.

The U.S. Food and Drug Administration already has given permission to use whole hake to produce the concentrate and is looking at the use of other whole fish, such as bottom fish. Edible fish parts thrown away after filleting also might be used in the process, he said.

Law's plans include refining the protein concentrate.

"We will continue to work on ways of further reducing the taste and smell," he said. "We think we can eliminate it entirely."

That might even gain a grudging nod from a skeptical gourmet. ■

If the project continues on schedule, hake such as these will be processed at the Astoria pilot plant this spring.

Work in Progress

This chub swims in energy's path

The Borax Lake chub's fondness for hot water could put it in hot water, an OSU researcher is predicting.

The tiny fish's only known home in the world is a small lake in the middle of Southeastern Oregon's Alvord Basin.

"The land in the basin has a rich supply of geothermal resources," said Jack Williams, a fisheries and wildlife graduate student studying the creature. "Oil companies are considering it as a future energy source. This is a threat to the fish since they depend on thermal springs for their water supply."

Williams said the Oregon Department of Fish and Wildlife has put the Borax Lake chub, or *Gila boraxobius*, on its protected species list, and efforts are being made to get the fish on the federal endangered species list. The chub already is listed as threatened by the American Fisheries Society.

"We certainly are not trying to wipe out geothermal development in the Alvord Basin," he said. "We just hope the Bureau of Land Management will not lease out a 1,000-yard or so area around the lake."

Williams said because the 1- to 1½-inch fish, which lives in 10-acre Borax Lake in Harney County about five miles northeast of the town of Fields, was of no economic importance in the past, little study was done before he and his wife, Cynthia, started collecting data on the chub's feeding habits in March 1978.

A single large lake once covered much of the Alvord Basin, Williams said, but it dried up 7,000 to 10,000 years ago, leaving the Borax Lake chub isolated in Borax Lake and its outflow waters.

"The temperature of Borax Lake ranges up to 93 degrees Fahrenheit, making it the warmest fish habitat in Oregon," he said.

The chub, dark silver in color, survives in the clear silt- and rock-bottomed lake, which is almost devoid of aquatic vegetation, by eating algae and microcrustaceans in the winter and insects in the summer, said Williams.

He and his wife, an OSU undergraduate majoring in biology, plan to submit an article on their research to a journal, *The Great Basin Naturalist*. They also plan to compare the Borax Lake chub to chubs living in other Oregon lakes. ■

Well placed pecks save chicks' necks

OSU poultry scientists are trying to help commercial broiler producers remove some nonconformists from the industry.

The effort is aimed at hens that lay near-symmetrical eggs—eggs that confuse persons positioning them for incubation and cause trouble for the chicks within.

The problem, according to researchers Fred Benoff and Joe Renden, exists because survival rates are higher if an egg's air cell, in the larger, blunt end of a "normal" egg, is put in the up position during incubation.

With symmetrical eggs, it is hard to locate the end with the air cell so it can be positioned up (encouraging chicks to hatch through that end), said the researchers.

Benoff and Renden have developed a system for measuring egg shapes and used it to come up with standard diameter ratios for the shape of eggs.

They said broiler producers may be able to profit from the work by measuring eggs to identify those with abnormal diameter ratios and removing the hens that laid them from their foundation breeding stock.

Benoff said a chick's chances for survival are about 20 percent higher if it pecks through the air cell, allowing it to use its lungs before venturing out of the egg. ■

Japanese sweet on eating corn

Oregon ought to keep an eye on Japan's sweet tooth.

That is the advice of two OSU researchers studying "supersweet" varieties of corn.

"The supersweets aren't new," said horticulturist Jim Baggett, who is conducting the studies with food scientist George Varseveld. "They've been grown in the United States for many years. But now the Japanese are learning to like sweet corn, particularly supersweet corn, and that could be a profitable market for Oregon."

The researchers said trials with two supersweet varieties, part of a search for better corn, disclosed some growth limitations.

One variety, "Florida Staysweet," was not well-suited to Oregon's relatively cool, short growing season. The other variety, "Xtrasweet '77," grew well. But more evaluation is needed before commercial production in Oregon can be realistically considered, the researchers said.

Varseveld said the two corn varieties were well received by OSU and industry taste panels. But the panels showed no clearcut preference for the supersweet corn, which has a higher natural sweetness but tougher kernels at harvest time than conventional sweet corn varieties such as "Jubilee."

Baggett and Varseveld are evaluating additional varieties of supersweet corn. ■

Bugs don't tell sanitation story

An OSU food scientist says Oregon and other states may want to consider altering the way they use bacterial tests in their retail grocery store inspection programs.

Researcher Jane Wyatt said her analysis of meat samples from Oregon stores found no direct link between sanitation practices in the

stores and the bacterial content of the meat.

"I don't mean to say bacterial analyses aren't important," said Wyatt. "They most certainly are in evaluating food quality and safety. But our initial finding is that they do not tell us a great deal about sanitation practices."

Wyatt said bacterial tests are used in the sanitation portion of inspections in an attempt to inject objectivity into the process.

"The problem comes in deciding what is clean," she said. "It's subjective. Clean and sanitary mean different things to different people."

The OSU scientist said she thinks factors such as temperature control of foods and the overall attitudes of employees should be given more weight when stores are inspected.

Wyatt and graduate assistant Vicki Guy are attempting to refine a numerical grading system—developed for their meat sample study—which would place greater emphasis on those factors.

Wyatt plans to conduct additional studies to try and identify precise relationships between sanitation practices and the total bacterial content and quality and safety of foods processed in grocery stores. ■

A new 'Pogo' needs friend

A tool that looks like a pogo stick has some Oregon farmers and gardeners jumping.

It is a hand-held seed and fertilizer planter devised by OSU agricultural engineers in cooperation with the OSU Office of International Agriculture.

"People are getting excited; we're getting a lot of requests," said Ron Miner, head of the OSU agricultural engineering department. "But we can't deliver the planter. It's not our role. I hope some local company will decide to manufacture them."

Miner said word of the efficient performance—in campus areas covered with corn stalks and other debris—of the four-foot-high metal

Hand-held planter.

planter, designed as a tool for researchers experimenting with farming untilled, mulch-covered land in Costa Rica, first attracted the attention of home gardeners in the Corvallis area.

"There's nothing all that new about the idea," he said. "But I do see this as a good tool for the home gardener and the small-plot farmer. You could plant initially with it, or it would be great for reseeding spots that didn't do so well."

Prototypes of the device are being shipped to Costa Rica and Puerto Rico for use by researchers, and Miner hopes local farmers in those areas will find the planter helpful.

He said representatives of several U.S. firms interested in manufacturing the planter have met with OSU designers. ■

Old orchards leave traces of arsenic

WANTED: a crop that grows well in heavy clay soil containing traces of arsenic.

OSU agronomist John Yungen knows pears do. He is conducting studies at the Southern Oregon Agricultural Experiment Station at Medford to learn how farmers in the area might use land where pear orchards once stood.

"It's a preliminary study linked to land use planning," said Yungen, who has tested one planting of corn, tomatoes, beets, carrots, beans, alfalfa and other crops on a Station plot that was part of a pear orchard until trees were removed about three years ago.

He said the plot's arsenic content, common in old orchard soil, is the result of heavy applications of insecticides in the 1920s and 1930s to control the codling moth, a menace to pears.

According to Yungen, pear growers estimate that aging trees will be removed from more than 7,000 acres in the Rogue River Valley over the next 10 years and many will not be replaced with new trees. Orchards will not be restarted because growers want to locate their trees nearer water sources for new overhead sprinkler frost protection systems, in lighter, easier-to-drain soil and for several other reasons.

Yungen, whose study is just beginning, said the arsenic does not appear to be a major problem, especially when phosphate fertilizer is applied to the soil to keep plant roots from becoming clogged with the substance.

He said corn, tomatoes, alfalfa and beets all did well this year. He plans to test other crops, including sunflowers.

Is the arsenic a danger to consumers? Yungen said earlier studies, including several in old orchard areas in Washington, found that little arsenic in the soil is taken up into edible parts of fruits and vegetables. ■

profile

He grew up to manage station down the road

Dwayne Buxton knows what it is like when a university-based agricultural researcher climbs down from the "ivory tower" into the realm of production-oriented farmers and ranchers.

The experience is fresh on his mind.

"I had hardly gotten here when people started asking me what variety of wheat to plant and what fertilizer levels they should use," said Buxton, who two years ago left a position as a professor of agronomy at the University of Arizona to become superintendent of OSU's Malheur Agricultural Experiment Station at Ontario.

"I really didn't know the answers to their questions. I wasn't even oriented yet. But that's one good thing about this job—it gets you moving."

Buxton, who grew up on a Vale, Oregon, farm less than 10 miles from the Malheur station, said he was hardly aware of the facility as a boy.

During his nine years at Arizona, following graduate work in Utah and the Midwest, he focused on cotton production.

"I was interested in getting closer to production agriculture, leaving the ivory tower for awhile, when I learned of the opening in Oregon," he said. "And, also, my wife and I felt a smaller community would be a better place to raise our children."

With the move, his scope of professional duties changed from one crop to "jack of all" for Oregon crops grown in the Treasure Valley, an 80-mile-long irrigated strip that is one of Oregon's most diverse and productive agricultural areas.

"When I arrived," said Buxton, "I felt very strongly that the branch stations shouldn't be too provincial, the work should fit in with other research at branch stations, the main campus and outside the state so you wouldn't waste time and money trying to re-invent the wheel. I've found out it's a constant fight because, by its nature, a branch station is provincial.

"We're the most remote station from campus, and there's a tendency to try and be all things to all people, he continued. "But I know Chuck (Malheur agronomist Chuck Stanger) and I can't do that. It makes for some hard decisions because there are 10 major crops plus livestock in this valley and a lot of justifiable demands."

But being across the state from the main campus—and nearer the field day-to-day—has its rewards, Buxton said.

"You're kind of vulnerable. If someone is critical of the station, I know that's me. I can't hide behind the university. But on the other hand you find out firsthand the growers' needs and thoughts. You don't sit around thinking up questions—they are already there."

That wasn't true right off. Buxton said it took him "about a year just to learn the right questions to ask." With two years behind him, he thinks he has learned to manage the branch station without spending too much time "putting out brushfires."

How does he do it? One day recently a farmer called to ask what to do about a skunk that had crawled under his house.

"I referred him to the Extension Service," said Buxton. ■

Director
Agricultural Experiment Station
Oregon State University
Corvallis, OR 97331

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