Oregon's Agricultural

Progress

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Agricultural Experiment Station
Oregon State University

John R. Davis
Director

CONFLICT

Stress keeps growing, too

The human race must be tremendously patient and resilient because our history and our own lives seem to be spent in resolving conflict.

The Bicentennial Year was a celebration of a successful conflict but one can imagine that the revolutionaries at that time really agonized about their conflicts with neighbors and others. The settlement of the West involved substantial conflicts—the pioneers who encountered great hardships and often left members of the family to move West, the conflicts between ranchers and sodbusters, between landowners and squatters, between irrigators and other water users—the list is fairly long.

We might say that our country and our systems of government have become strong as a result of successful resolution of conflicts, among other things. Hopefully, our own personal attitudes and way of life also have become stronger, but we must admit that "it ain't easy."

Today, there are more conflicts involving agriculture than ever before, especially with increasing government regulation and the uncertainties of some markets. In Oregon, the most notable conflict involves open field burning and the resulting atmospheric pollution by smoke particles. In this case, the conflict was resolved by legislation to reduce the area that could be burned—at this time we are still not sure that this was a successful resolution of the conflict.

Many other conflicts are currently brewing in various parts of the state that involve various public segments —the use of DDT for control of the Douglas fir tussock moth, the possible effects on vineyards in Washington of 2,4-D used on wheat in Oregon, the question of grazing livestock and haying on the production of waterfowl in the Malheur National Wildlife Refuge, the use or discontinuance of use of certain pesticides that have substantial economic impact on agriculture and possibly on food costs—to name just a few examples.

In most instances, the Agricultural Experiment Station and our colleagues in Extension Service recognize the development of a conflict, and do our best to become involved through appropriate programs of research and extension.

An example was our reaction last summer to the proposed initiative measure related to corporate farming, which is not active this year because the petition failed to collect enough signatures. Recognizing that many issues are involved with corporate farming, we felt a keen responsibility to research all the facts about farming in Oregon, and to develop an educational program to inform the parties involved and the citizens of Oregon. Even though the petition failed, we still plan to publish a "White Paper" on corporate farming in Oregon so that as the issues of corporate farming create new questions perhaps we will have some answers.

Even when we get involved in a research and educational program, we sometimes take our lumps because the results may appear to

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favor one side of a conflict over the other. But that's life, and we expect from time to time to be criticized for appearing to take sides on an issue. We do not expect to be loved by everyone but the point in mentioning this is to remind even our closest friends that we are a research institution that intends to be involved in conflicts in the best interests of all Oregonians and that even if our results are unfavorable, we hope we'll still be friends.

Keep in mind that a university may be one of the only institutions left that is relatively free from political or economic bias. Because of that, we have an ability to collect and analyze data, to evaluate comparable work done elsewhere, and to arrive at technical or scientific conclusions —and all can be depended upon.

We feel a university and the Agricultural Experiment Station deserve the public trust and that we also need to earn that trust. We will never earn that confidence, however, unless we are involved in providing information to resolve conflicts or unless our research is at the leading edge of needed new knowledge.

Conflicts these days seem to involve personal confrontations, legal hassles and sometimes very violent actions. What we need are cool heads and the best possible information to reach decisions. What we need, in other words, is a good university that is in touch with its publics and has a viable and modern program of research. Obviously, we need each other.

Progress

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Rhodies no longer nibbled nightly

Agricultural research has moved into the backyard rhododendron garden.

Oregon State University entomologists Richard Clarke and Harry Bell have been taking a close look at the obscure root weevil, long the nemesis of the backyard rhododendron grower.

"Some gardeners probably have this little fellow chewing on their plants and don't know what's happening," said Clarke. "It's inactive during the day and feeds at night so all most people see is the damage."

Their Agricultural Experiment Station research centered on this particular species of root weevil which notches the leaf edge of many plants, most notably the rhododendron.

The pest which is native to Oregon has menaced strawberry growers for years. First DDT was a control agent, then Aldrin and Chlordane.

"Now that all these chemicals have been either suspended or banned, the strawberry growers have a new chemical that works well on root weevil," said Clarke. "The only problem is, it is much too toxic for backyard use and it's doubtful if it will be registered for rhododendrons.

"This means the insect can easily walk into a yard and attack rhodies," said Clarke. "The obscure root weevil

doesn't fly, but you would be surprised where it can walk if left unchecked."

Since most earlier root weevil research pertained to large acreages of strawberries, the work on root weevils in the backyard had to start at the beginning: where do they lay their eggs and where do they over-winter?

"At first we found the immature stage over-wintering on the roots as was traditionally thought," Clarke said. "But then we found that some of the insects also over-winter as adults.

"This meant that in addition to the traditional egg-laying period of August

Above, left: Rhododendron leaves show signs of root weevil damage while the culprit takes a break. Below, left: Root weevil at work. Below: Healthy rhododendrons in bloom.

to mid-October, there also was a short egg-laying period in May," said Clarke.

The researchers found that although there were egg laying adult root weevils present in May their number was very small. About mid-June, the quantity went up drastically, but the insects were very young and did not begin egg laying until August.

"This indicated the best time to spray, if we can get something to spray, was not early in the spring and throughout the summer, but later, beginning when the numbers were high in mid-July," said Clarke.

Bell and Clarke also made another significant discovery. There is a parasitic fly found in local pockets of the Willamette Valley. The immature parasite feeds on the ovaries of the root weevil adults so that even though root weevils appear one year, fewer may emerge the next. The OSU team is looking into the possibility of a natural parasitic control.

Because of the work being done by the OSU team, more efficient timing of chemical control of root weevils seems possible.

"Hopefully, by spring, there will be a product on the market to better control obscure root weevil," said Clarke. "It is being evaluated in this area now and we don't think there will be any problem with clearance for statewide use."

Just as some inventors seemed to do their best work in the backyard, the first backyard research on the obscure root weevil seems to be doing very well.

Scratch another shaggy dog story

A scratching dog has fleas.

Not necessarily, said two veterinarians who have just published a review of 35 cases of skin inflammation in dogs.

John A. Schmitz, Oregon State University veterinarian, and Gene Nesbit, Portland veterinary dermatology consultant, studied two types of dermatitis.

One was irritant contact dermatitis (ICD). The dogs reacted immediately on contact with the allergic substance (known as the reactant).

The second ailment was allergic contact dermatitis (ACD). The animal's first exposures to the allergic substance were sensitizing doses and then the exposures became reactant.

"This parallels a situation in humans who are allergic to bee stings," said Schmitz. "The first few stings serve as sensitizers then, as the cumulative effect builds up, a sting becomes a reactant."

Of 650 dermatological cases referred to the Animal Skin and Allergy Clinics in Portland and Seattle, contact dermatitis was diagnosed in 35 cases—33 cases of ACD and 2 cases of ICD.

"In dogs as well as humans, all allergic contact reactions require repeated exposure to the allergen," said Schmitz. "Plastics, leather, detergents, floor waxes, wool and synthetic rugs, fertilizer and mop sprays are some of the more common substances that induce allergic contact dermatitis in dogs."

The researchers found that several dogs also had allergic inhalant dermatitis (AID), closely related to the human problem of "hay fever." In humans, AID usually attacks the respiratory organs—lung and nose—but in dogs the target is the skin. The symptoms seem to be similar to both ACD and ICD symptoms.

"History of the dog is the single most important element in evaluation of a dog with dermatitis," said Schmitz. "Talking with the owner is very important."

One of the more unusual cases involved a 6-year-old male Chihuahua which had an itching problem and developed ear skin infection which kept recurring. The dog's owners said the symptoms were especially bad after the dog had been in their car but that on a long trip to the Midwest there had been no problem.

After investigation, it was determined that the owner had started salmon fishing two years before and carried fish home on the back seat of the car. He also scaled fish in the same spot in the backyard, a place the dog liked to roll in.

Removal of the fish scales relieved the dog's symptoms.

"The research in allergic reactions of dogs has a double effect," said Schmitz. "Because a lot of the findings can pertain to humans. Someday there will be full relief for the man who suffers from allergies—and also for man's best friend."

A basin full of earthly bounty

Dry, barren, isolated.

A few years ago, those words often were used to describe northeastern Oregon's Columbia Basin.

But today, the desert blooms with a variety of new crops, rolling hillsides support dense stands of wheat and other cereal grains and small towns spring into centers of commerce almost overnight.

Growing with the Columbia Basin is CBARC—the Columbia Basin Agricultural Research Center, formed in 1973 when the branch experiment stations at Pendleton, Hermiston and Moro were administratively combined.

Work at the three centers has had a long history of cooperation with the U.S. Department of Agriculture.

The Sherman Station was established in 1910 on 235 acres of land provided by Sherman County near the town of Moro under a long-term agreement between the Oregon Agricultural Experiment Station and the federal Bureau of Plant Industry. Then, as today, the site was a prime source of information on dry land crop production and soil management for eastern Oregon.

Also in 1910, the Umatilla Field Station was established by USDA to aid farmers on the irrigated sands of the Columbia Basin. Today, the station, near Hermiston, occupies 290 acres with approximately 190 acres available for irrigation studies. Experiments involve work on irrigated crops, livestock feeding studies and beef progeny tests.

Harvesters on the move at Pendleton.

The Pendleton station was established in 1928 on land owned by Umatilla County as a cooperative project between the Agricultural Experiment Station and the USDA's Division of Dryland Agriculture. Most of the research at the Pendleton station has been aimed toward development of dryland crop varieties and improvement of cultural practices, soil and water management, nutrition and erosion control.

The Pendleton station, which shares USDA facilities, is the administrative center for CBARC. But center superintendent Steve Lund, who has been in Oregon for just one year, is keenly aware of the current problems facing each station.

"We have tremendous potential for change in the Columbia Basin," said Lund. "In the Hermiston-Boardman area, irrigated agriculture is creating more need for erosion control, water management and investigation of new crops. We're rapidly approaching a time when Oregon's potato industry will be the biggest in the nation . . . right now we're getting better yields than Idaho . . . and processing is just beginning to develop."

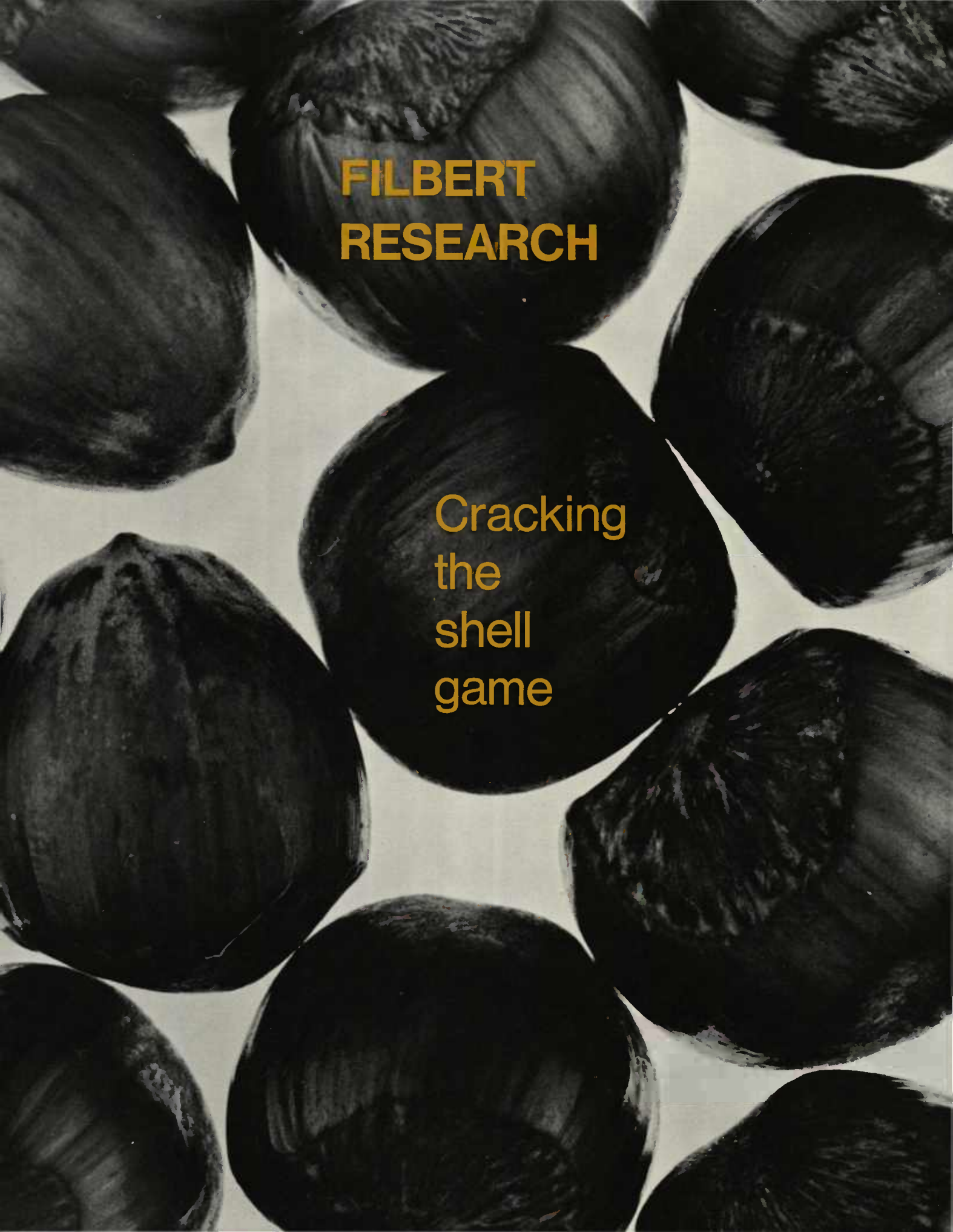
Lund said plans for the Hermiston station include drilling a new well to help station scientists do more irrigation research, in addition to water management, erosion control, new crop testing and cattle production work already under way.

"But while irrigation opens up a whole new Pandora's box, research at both the Pendleton and Sherman stations will continue to concentrate heavily on wheat production because this is wheat country," said Lund. "The Sherman Station is an important area for dryland agriculture and is serving a valuable function for researchers from both CBARC and Oregon State University. And cooperative work at the Pendleton Station, including scientists from OSU, USDA and CBARC is very valuable."

Work with standard soft white winter wheats and club wheats, feed grains including wheats, barley, triticale, sorghum and oats, chemical, cultural and biological control of weeds, minimum tillage, disease control, water and nutrient management combine to form a cereals program with international impact.

"As new problems crop up, we will try to meet them," Lund said.

Left: Many hands are needed to help evaluate wheat trials. Above, right: New potato planting methods may help stop erosion problems in the Columbia Basin. Below, right: Animal evaluations are part of the program at the Hermiston station.


FILBERT
RESEARCH
Cracking
the
shell
game

New variety takes time --20 years

Maxine Thompson—venture for a new variety.

It takes patience—and about 20 years —to come up with a new variety of filbert.

Maxine Thompson, horticulturist who has been working on new varieties of filbert at OSU since 1968, has both. She is one of the few filbert breeders in the world, a select company since western Oregon (95 percent) and western Washington (5 percent) produce nearly all the U.S. filbert crop and share the world market with Turkey, France, Spain and Italy.

"We are looking for new main-crop varieties and new pollenizers," said Thompson.

"We need a better filbert than Barcelona, the mainstay of the industry since it was established in the Northwest in the early 1900s."

Barcelona was picked after many varieties were screened and tested by OSU and growers. Since filberts will not set nuts with their own pollen, growers have to use another variety for pollination, planting about 10 percent of their orchards in pollenizers. Most Northwest growers use Daviana.

"Our objectives for new varieties are for two kinds of nuts," said Thompson.

"For the kernel market, which includes the confectionery and bakery trade and nut stores, we need a good, clean kernel, a nut with a high percentage of kernel, one that matures early and produces regularly.

"For the in-shell market, we need a large, attractive shell with the best quality kernel possible but the shell must be thin enough to crack easily and there must be high productivity."

Another objective is a better pollenizer than Daviana, which produces a limited number of different type of nuts than Barcelona. Also needed is a pollenizer more resistant to an enemy—big bud mites.

The search for a better filbert (hazel nut to some) continued through the years. Recent efforts to discover a better filbert began with Quentin B. Zielinski established a worldwide variety collection at OSU's North Willamette Experiment Station at Aurora.

The limiting traits of Barcelona had been recognized for some time and by 1968 it was realized that there were no varieties superior to Barcelona in the collection of 150 varieties.

So Thompson began a breeding program, picking out about a dozen varieties from the OSU collection of 150 varieties.

Said Thompson:

"Barcelona is a vigorous, good growing tree but its shell is too thick and hard to crack by hand. Because of its low percentage of kernel (42-44 percent), Barcelona is uneconomic to crack.

"The kernel has a lot of fibrous material on it and the variety matures too late for Oregon, pushing harvest, nearly all mechanical, into the mud season. The Barcelona also is alternate bearing, with a heavy production year followed by a light year, and there are too many empty shells."

To find the answers to these problems, Thompson chose filbert parents she hopes will make good combinations, putting plastic cages over trees for about four months in the winter to keep out foreign pollen, and making crosses of varieties. When the nuts develop, they are cracked and the seeds are planted in the greenhouse in September.

Each year, Thompson plants about 2,000 new trees. Then she waits—for 4 or 5 years, until the tree is big enough to produce a few nuts.

After the second year of evaluation, repropagation of selected hybrids begins, perhaps with 100 trees. After two years of repropagation and perhaps 5 more years in trial plantings to get an idea about bearing qualities if the variety really looks good, it goes to growers where it will be evaluated for another 5 or 6 years.

Thompson often has 8,000 hybrid filbert trees growing at one time, all under constant supervision and scrutiny on how good they will be as potential new varieties or as parents.

"We have two selections which look promising," she said. "One looks like a potential pollenizer for Barcelona and the other looks good for a kernel type variety. We now are at the stage of repropagating them for trial planting for further observation before we distribute any material to growers."

Thompson, who has imported the best breeding material of Turkey (our biggest competitor) and France, Italy and Spain, also looks for disease resistance, particularly for eastern filbert blight. The disease, a problem in Washington, has hardly touched Oregon as yet.

She would like to see nuts from some new selection analyzed for flavor and storage characteristics. Tree shape also is important in breeding. In the long wait—25 years from first pollination to a significant crop in grower orchards—there is plenty of time and not enough time.

That's where patience comes in.

Diseases: unraveling the nut knot

Filbert diseases are hard nuts to crack.

Plant pathologist H. Ronald Cameron should know. He has been working intensively on three relatively new diseases for several years, and not one sign of remedy has appeared.

"In the summer of 1957, a disease which we have titled filbert stunt appeared in an orchard near Forest Grove. During the 19 years we have observed the disease, it has spread to four additional locations—all within the same orchard—and has affected 305 trees. Since the diseased area is on the border of a major nut-producing area, it is considered a threat to Oregon's filbert crop," Cameron said.

Filbert stunt symptoms start with small, light green leaves. The damaged leaves have a dull cast and margins curl toward the surface, and the tree looks underwatered and undernourished. By the second season, leaves are about one-eighth their normal size, sparse and dull yellow. The feeder roots disappear and the tree dies very slowly.

"So far, we know very little about the disease. We know it spreads through the roots, but we don't know what causes it," Cameron said.

And that's not the only problem plaguing the Experiment Station researcher.

A minor disease was identified on two filbert trees in Oregon several years ago. At first, Cameron thought the disease was unknown, but later it was identified as hazelnut mosaic virus.

"Symptoms of hazelnut mosaic virus are a bright yellow pattern in the leaves," Cameron said. "Although this is not an industry problem now, and does not appear to be spreading, we want to keep watching for any new infections."

The third problem on Cameron's list is one that could devastate the entire Northwest filbert industry.

No case of Eastern filbert blight, a fungus disease, had been reported since 1937 until it was discovered in two Washington state orchards a few years ago. After inspecting orchards in Oregon, researchers found the disease had moved across the Columbia River and infected two orchards near St. Helens. Since the first cases were reported, additional trees have been found, and now the disease is mapped over a 200 square mile area mostly in Washington.

"We know of 45 orchards where there is at least one infected tree," Cameron said. "And we keep finding others."

The main approach to the problem has been to cut out infected parts of trees. "Last year, in a 12 by 15 block of trees in a diseased orchard, we cut out as much of the diseased trees as we could find. This year we went back into the orchard again and pulled out 24 trailer loads of infected material," Cameron said.

But cutting did not solve the problem of how disease infected the trees initially. Cameron, working with research assistant Lee Anderson and graduate student Tim Gottwald, started looking last year for the weak link in the fungus disease. Eastern filbert blight is spread by spores and the researchers felt if they could find a time of year when spore movement was highest, they could begin to find ways of stopping the spore spread.

"We set up trapping systems to monitor the air near trees, and in nine months of looking, not one spore was found," Cameron said. "This winter, we will try to find spores in rainwater."

At one point, researchers thought they had found the answer. Big bud mites, they thought, could be spreading the disease since they travel between trees. But after trapping and checking the mites, not one spore was found.

"We thought that if big bud mites were the vectors, we could control them and stop the blight spread," Cameron said. "The mites may still be involved by predisposing the tree to infection."

Luckily, Barcelona filbert trees, the main variety grown in Oregon are not as susceptible as Daviana, the trees used most often for pollination of Barcelona filberts.

Cameron thinks the long-term answer to the problem is development of new disease-resistant filbert varieties.

"This year, 50 selections obtained from Maxine Thompson, OSU filbert breeder, will be set out in an infected orchard in Washington. If they are susceptible to Eastern filbert blight, they will be removed from the breeding program."

But the fight against blight will be a long one. Cameron said he wishes a simple answer would emerge, but he admits progress is slow.

"We were hoping some quick experiments would identify the problems. Both of the major diseases looked so simple when we started out, but now we're having to take the long way around. Sometimes it's very frustrating."

But the OSU plant pathologist will keep hammering on the diseases until the hard shell finally cracks.

Sneaky mite found out

The verdict is in: *C. vermiformis* is guilty.

The crime: aiding in big bud damage to filberts.

For many years, scientists believed *Cedidophyopsis vermiformis* mites merely were living in the cozy environment of their more sinister mite cousins, *Phytocoptella avellanae*. The full blame for big bud damage, which causes buds on filbert trees to swell, prematurely open, dry out and fall from the trees, was placed on *P. avellanae*.

But Oregon State University research entomologist G. W. Krantz started some detective work and found both species shared the damage.

"We found both mites compete in the same plant, but are active in different seasons," Krantz said. "Big bud damage causes a three to five percent bud loss in the summer and a 20 percent bud loss in later winter and spring in certain varieties. The earlier loss, we determined, was caused by *C. vermiformis.*"

Prior to Krantz's research, scientists and growers attributed the summer bud loss to hypersensitivity of the plant to *P. avellanea* invasion.

However, when the summer big buds were examined under a microscope, Krantz found heavy infestations of *C. vermiformis* mites, and few or no *P. avellanae*.

"Both mites begin to migrate into new buds in the spring," Krantz said. "But *P. avellanae* mites are in a nymph stage then and generally remain dormant for one to three months before molting and reproduction begins. *C. vermiformis* mites enter the medium-sized buds as adults and increase in population immediately. It appears that summer bud loss occurs where *C. vermiformis* populations are dominant over *P. avellanae* populations.

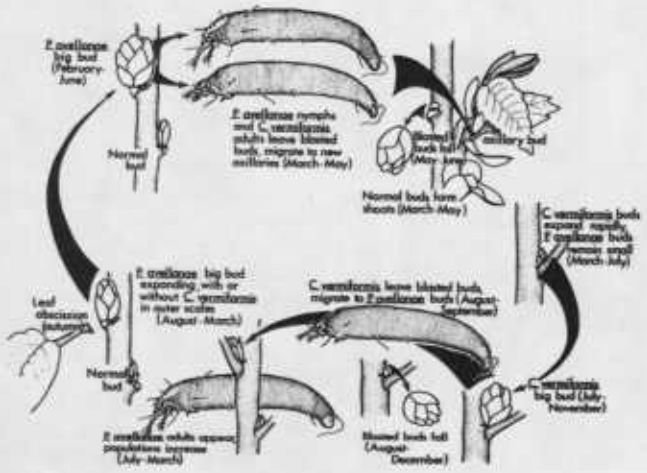
Buds infested with mites average 3½-4 mm in length by mid-July compared with 2½ mm for uninfested buds. Buds with mites often develop a reddish-brown discoloration on one or more outer scales and a distinctly broad bud tip. Uninfested buds remain light green on the outside and retain their narrow tip.

Both species of mites can be controlled with pesticides, and not all filbert varieties are susceptible to big bud mites.

"Barcelona—the major filbert variety now grown in Oregon—is resistant to big bud mites," Krantz said. "However, Daviana, the popular pollinizing filbert variety is highly susceptible to big bud mites and new varieties being developed —which are superior to Barcelona in many other ways—also are susceptible to the pests. By working on the problem now, we are hoping to eliminate future problems."

Thiodan, a pesticide, is effective in controlling the two mite species, when applied at one pound per 100 gallons of water. However, the critical factor in using the pesticide is the amount of time involved in the mite migration. Trees must be sprayed when *P. avellanae* nymphs and *C. vermiformis* adults are making their spring migration into new buds.

"When there is an extended wet spring, the mites can move during a longer period of time, and growers must spray more often," Krantz said. "We hope that by continuing this research, we can perfect better methods of control."



Mighty moth makes a move

A moth no larger than an eraser on a pencil is threatening to put more red ink in the ledgers of Oregon filbert growers.

The oblique banded leaf roller is not a new pest to growers. For many years, it presented a minor problem by feeding on tree leaves. But in the last two years, growers in Marion and Benton counties started observing a change in the insect's feeding habits. Instead of chewing on leaves, young larvae moved to a more crucial area—inside the nut husk.

The damaged nuts appear stained and underdeveloped with feeding holes and a little webbing. Nuts then fall from trees in clusters. In one orchard last year, a grower reported at least a 25 per cent loss of crop because of oblique banded leaf roller infestation.

"We don't know why the insects suddenly changed their feeding habits," said M. T. AliNiazee, OSU entomologist working on the problem. "But we feel this will be quite a large problem with serious economic implications."

AliNiazee and other researchers had worked several years to revamp the filbert spraying program used by growers. They felt if one spray could be eliminated from the four-spray cycle, growers could cut their cost substantially.

Now, filbert growers spray their orchards once in May to get rid of the filbert leaf roller moth, once in late June or early July for the filbert aphid and in both late July and August for filbert worms.

"We worked very hard to perfect a system of integrated pest management for filberts," AliNiazee said. "We found if growers changed the type of spray used in May, they could avoid killing the natural predators and parasites of filbert aphids. But with the new problem presented by the oblique banded leaf roller, growers will have to spray during mid-June and early September, times when no sprays are required now.

"Growers simply aren't making enough money for another spray," he said. "It's not a big crop and growers can't go on spraying. I'm very

Continued p. 12

concerned about the impact presented by the oblique banded leaf roller."

The Agricultural Experiment Station entomologist said control of the pests will be difficult because of the moth's life cycle. Oblique banded leaf rollers produce two generations per year. The first adults emerge from their wintering areas near the end of May and early June and lay their eggs. Young larvae emerge and then lodge themselves between the husks and nuts, which causes the most serious damage. Late in summer, the new generation of moths emerges, mates and lays their eggs which winter as larvae and emerge again in the spring of the next year.

"We have successfully used a pheromone (chemical sex attractant) trapping system to detect emergence," AliNiazee said. "But the time when the larvae are moving is a critical time for spraying—maybe a total of two or three days. And since the time of that spray doesn't coincide with the times of any other sprays, growers would have to bear the expense of one more spray."

So far, the moths have created problems in only two Oregon counties and only a few orchards. AliNiazee is hoping research conducted this year will help provide some information about the pest—information that may help stop the problem before it becomes widespread.

Meanwhile, as populations of oblique banded leaf rollers grow, concerns of growers—barely making their crop pay now—are climbing, too.

Entomologist M. T. AliNiazee with filbert leaf roller moths.

Before you bite . . .

With a strong arm, two days and a warm corner, you can dry your own filberts at home.

Nuts can be dried in the shell or they can be shelled and then dried. However, shelling the nuts first saves time and energy.

Dry filberts on screened trays, in onion sacks or other mesh containers to permit free air passage. Small amounts can be dried over the furnace or radiator, but the temperature should not exceed 105 degrees Fahrenheit (40 degrees Celsius).

At a temperature range of 95-105 degrees F. (35-40 degrees C.) filberts take about two days to dry. Firm at the start, they become spongy then become firm again at they start to dry. The internal color gradually changes from white to a creamy color, and when the color changes reach the center of the kernel, the nut is dry.

Unshelled dry nuts should be stored in closed containers to keep them from getting wormy, and shelled nuts can be packed in plastic bags or jars and kept in the freezer.

But before you put them all into storage, relax and enjoy some of the fruits of your labor . . . while you soak your sore nut-cracking arm.

Trees get the drop on nature

Making filberts fall faster is just one of the jobs now being done by ethephon, a chemical hormone which—when applied to a plant—breaks down in the tissues to release ethylene.

What is ethylene?

"A gas that occurs naturally in plant leaves and fruit to accelerate their aging," said Harry Lagerstedt, USDA research horticulturist at OSU.

"An application of the chemical ethephon has the effect of using nature's own chemical system for aging—and it does it more rapidly."

Preharvest sprays of ethephon are being used to accelerate ripening of tomatoes and apples, to loosen cherries and blackberries and to hasten the drop of walnuts and filberts.

"Ethephon is becoming increasingly more important as a harvest aid for fruit and nut crops, either by hastening the period of maturity or by permitting more efficient mechanical harvesting," Lagerstedt said.

"In filberts, the husk which holds the nut can be aged more rapidly. Then the nut is released sooner and harvest can begin earlier and proceed under better weather conditions."

The use of ethephon is especially advantageous in years like 1975 when a cool growing season delayed filbert husk maturity. Lagerstedt worked out the details for a spray program in which more than 1,000 acres of filbert trees were treated with ethephon last year.

Questions about how the chemical works on the trees were being sought so Lagerstedt arranged for Francis Kwong, a graduate assistant in OSU's horticulture department, to study ethephon for his Master of Science program.

Kwong wanted to determine whether ethephon is translocated from the leaves of the tree to the husks or whether only the husks of the tree need to be covered with spray to hasten nut drop.

"In normal spraying practice, the large leaves of the filbert tree intercept most of the ethephon. The husks are a much smaller target," Lagerstedt said.

"But in his research, Mr. Kwong found that ethephon is readily translocated

from the leaves to the husks where it releases ethylene and accelerates nut drop. In fact, he proved it three different ways."

The first method was a direct approach, comparing three methods of treatment on the rate of nut drop. Entire limbs were sprayed with ethephon, covering both leaves and husks. On other limbs, husks were covered with bags so only the leaves would be sprayed. On control limbs, no ethephon was sprayed.

Kwong then compared nut drop. The first nuts to drop were on limbs where both leaves and nut clusters had been sprayed. Next to drop their nuts were limbs where the nut clusters had been bagged to protect husks from the spray but where the leaves had been sprayed. Last to drop nuts were untreated limbs.

"This indicated that ethephon was present in the husks even though only the leaves had been treated," Lagerstedt said. "Response was not as great as where both leaves and husks were sprayed, but it was significantly greater than control branches."

The method Kwong tried next was measuring the amount of ethylene gas released by the husks. Again, husks were taken from untreated limbs, totally treated limbs and limbs where nut clusters had been bagged prior to treatment.

Francis Kwong shows how a special film allowed filbert leaves to take their own photographs.

Husks from bagged clusters had more ethylene than those from untreated branches but not as much as husks from totally treated branches. Lagerstedt said this second test indicated that ethephon moves from leaves to husks where it breaks down to ethylene gas. It also substantiates the first test.

In the third test, Kwong used radioactive tracers to follow the movement of ethephon. In that instance, radioactive ethephon was applied only to leaves. Analysis of husk tissue did show radioactivity and Kwong was able to use the radioactive husks and leaves to take their own photograph using a special film sensitive to radioactive materials.

"Although the image was faint, the presence of radioactivity in the husks was unmistakable—a third indication that radioactive ethephon moved from the leaf to the husk," Lagerstedt said.

After the OSU tests, filbert growers now can be assured that the ethephon they spray on the leaves of their trees is going to the husks to make the nuts drop a little faster and move harvest time a little closer.

Management tools poured from a can

Two new developments in filbert orchard management are being tested at Oregon State University by USDA research horticulturist Harry Lagerstedt.

Using small amounts of the chemical herbicide 2,4-D in pruning paint, Lagerstedt discovered that wound healing occurred faster on filbert, walnut, apple and pear trees. "Used in minute quantities, 2,4-D stimulates cell growth," Lagerstedt said.

Large pruning wounds should always be sealed to encourage healing. Polyvinyl acetate paints work best because they form a seal which keeps pathogens out and moisture in. Growers need to prevent the wound from drying out during the healing process which occurs under the paint.

Filberts were the first trees tested with the chemical-paint combination because they are slow to callus. The amounts of 2,4-D tested experimentally were small—only 50-200 parts per million in polyvinyl acetate paint.

"Only a small percentage of the chemical actually touches the cut cells," he said. "We have found that higher concentrations can cause injury and that different tree species vary in their sensitivity to 2,4-D. This means that each species will have to be tested and an optimum concentration determined."

Lagerstedt said studies will continue to determine exact amounts of 2,4-D needed for callusing. The chemical is not now registered for use in pruning paints.

The second new advancement involves another chemical, Embark, a growth retardant. Lagerstedt said the new chemical shows promise as a way of slowing weed growth in filbert orchard aisles.

"Filbert growers need to maintain a stable surface in the aisle from which they can harvest the nuts," Lagerstedt said. "Instead of tilling the orchard, they keep the tree row weed free with herbicides and permit weeds to grow in the aisles. This weed growth is flail mowed five to seven times per year."

However, between the period of late August to mid-October no equipment can enter the orchard because the nuts are dropping. Rains during this period promote the growth of strong-rooted weeds and grasses which recover quickly from flailing. Their growth in the orchard aisles impede sweeping and pick-up operations during mechanical harvest.

"Embark—which retards growth for about a month—would hold the weeds back almost until harvest," Lagerstedt said. "And under cooler fall conditions, the chemical possibly could retard growth for longer than its usual four weeks."

Embark is not yet registered on any crop so all work with it is still in the experimental stages. No prices have been set for the new chemical and rates of application are still being worked out.

In tests at OSU, Lagerstedt applied Embark at one-quarter, one-half and one pound per acre. The chemical was effective at all three rates, but the USDA researcher said the minimum rate of application looked very encouraging.

"At higher rates, above one pound per acre, Embark can have a herbicide effect, and could actually kill the weeds in the aisles," he said.

Whether the chemical actually will be used in filbert orchard management will depend upon price, Lagerstedt said.

"If the price proves too high, it won't be practical for filbert growers. But if the price is right, it could be a big help at harvest time."

Union County takes a look --at itself

When residents of a rural Oregon county look toward the future, what do they see?

Agricultural and resource economists at Oregon State University found out when they asked residents of Union County—in the state's northeastern corner—to state their preferences for the area's future economic growth.

"After interviewing 250 households selected randomly, we found quite a number of acceptable alternatives for Union County," said J. B. Wyckoff, coordinator of Extension economics at OSU. "Employment opportunities can expand and new industry should be encouraged to locate in the area under certain conditions."

The main condition limiting the types of industry which will be encouraged to settle in Union County is whether the industry will harm the environment.

Four of five residents surveyed indicated they liked the natural surroundings, air and water quality, friendliness and quietness of the communities, and recreation opportunities available in Union County. And seven of 10 residents said they were unwilling to accept changes in those environmental features.

The sorts of industries Union County residents said they would find acceptable were "clean" and "non-polluting." Preferred growth sectors were Eastern Oregon State College in LaGrande, light industry, irrigated agriculture, ranching, a convalescent home and a modular/mobile home firm. Researchers found resistance to new heavy industry, increased logging and coal-fired electrical power generation plants.

The survey of county residents and business leaders is part of a larger Alternatives—Growth Center Project" study called "Oregon Future being conducted by OSU agricultural and resource economists.

A final report soon will be released detailing alternative strategies for growth in Union County, which is considered a "rural growth center."

Computer cow eats no hay

Now beef cattle are being fed into computers.

M. L. Hellickson, Oregon State University agricultural engineer, has revised a mathematical model of a beef animal developed by two researchers at Oklahoma State University and added a great degree of universality to it.

The model is a set of mathematical equations which the computer sees as a physical entity.

Hellickson's model can predict the growth of beef animals in nearly any confinement situation.

If the computer is fed data including average temperature, average relative humidity, energy value of the feed ration and type of confinement—indoor or outdoor—it can predict growth, average daily gain, feed conversion—kilogram of feed per kilogram of weight gain—and heat and moisture production of the average animal throughout the feeding program.

"The mathematical model is valuable as a valid prediction of animal responses," according to Hellickson. "The model also exhibits great value because it will repeat its responses to identical input where a live animal will not. Because of this assured repetition, the possibility exists of isolating specific variables previously inseparable in live animal research."

Future OSU research is planned in this area, he said.

Nature caught wasting energy in fixation

An Oregon State University researcher believes Mother Nature may be wasting energy.

Karel Schubert, a biochemist research associate working with plant physiologist Harold J. Evans in OSU's botany and plant pathology department, determined for the first time how much of the photosynthetic energy supplied for nitrogen fixation by many leguminous plants such as soybeans, alfalfa and clover is used to produce hydrogen—a gas which seems to serve no purpose in the biological fixation process.

"If energy used for the formation of hydrogen is being wasted, processes of reducing this waste or of utilizing the hydrogen gas for energy should be devised," said Schubert, whose research is supported by the Rockefeller Foundation, the National Science Foundation and the Oregon Agricultural Experiment Station.

Nitrogen, the most limiting component of plant growth aside from water, is also the most abundant element in the atmosphere, but few plants are capable of converting atmospheric nitrogen into ammonia through the complicated biological process known as nitrogen fixation.

The major source of fixed nitrogen is man-made anhydrous ammonia. In 1973, anhydrous ammonia supplied 42 percent of the 19 million tons of fixed nitrogen needed by agriculture. But because the fertilizer is produced through a petrochemical process, the price for fertilizer climbs while supplies of fossil fuels diminish. Shipping costs, especially to hard-to-reach developing nations, add more to the burdensome fertilizer prices.

But not all nitrogen-fixing plants are guilty of wasting energy, Schubert said.

"Non-leguminous plants such as alders are more efficient because they can reuse hydrogen for energy," he said. "Perhaps some of the same characteristics can be incorporated into the majority of leguminous plants or plant varieties can be selected with nitrogen-fixing efficiency as a consideration."

Schubert also said methods of capturing hydrogen gas, compressing it and using it as a fuel could be investigated.

"The only problem with that is hydrogen escapes very easily through many materials," he said.

"Since other studies at OSU have shown that other plants are capable of reutilizing the hydrogen produced by the fixation process, we may be able to reduce hydrogen evolution by genetic or chemical means. The impact of such studies may be substantial throughout the world," Schubert said.

Field burning approach cool

One approach to field burning research at Oregon State University, in a word, is cool.

As an alternative to burning, OSU crop physiologist Dave Chilcote is studying mechanical ways to remove perennial grass residue.

"We started this project about four years ago," said Chilcote. "We needed to discover if mechanical removal of the straw was a valuable tool.

"Recognizing there still is no use for the straw once removed, and that we have not really looked at the effect of mechanical removal on disease, we think this project has the potential for alleviating some problems grass seed growers encounter."

Two mechanical procedures are being compared to burning. The first is a commercial flail chopper to remove the straw and stubble as much as possible.

The second is called close clipping. This involves mowing it very short, brushing the stubble then vacuuming the field.

"Our tests showed burning was the best method of removing the organic residue. But as an alternative to burning, the close clip process was a close second with no substantial loss in seed yield to date," said Chilcote. "Flail chopping ran a poor third."

The test plots were planted four years ago and the experiments have been conducted each year to discover what effect the age of the grass plant might have on the efficiency of the mechanical alternatives.

"At first, the flail chopper seemed to do a good job with no real loss of seed yield," said Chilcote. "But after two years, when vegetation increased, the flail chopper's efficiency fell off very fast."

The Experiment Station researcher used a field sanitizer to get a uniform burn to compare to the mechanically removed areas and to assess the work of the burner as a possible prototype of a commercial burner.

Contained burning by field sanitizer was by far the most efficient of all methods used to remove organic material and promote good growth for the next season.

"Although no accurate economic data have been compiled on this project, it is going to be a costly procedure no matter how it is done," said Chilcote. "The mechanical removal process on an alternate year basis as a part of good burning management may have a place.

"Granted this is a long shot," said Chilcote. "But replacing burning is a tough problem and it is going to be a long shot that solves it."

Machine pulls a cap on a cold one

Researchers at Oregon State University have succeeded in getting the strawberry to doff its cap with ease.

The capping process, developed by Agricultural Experiment Station engineer Dale Kirk, brings Oregon's strawberry industry one step closer to full mechanization.

The hardest jobs involved in mechanical harvesting have been breeding a strawberry which would lend itself well to mechanical harvesting and developing a successful capping machine suited to the properties of that berry.

Kirk, working with another OSU agricultural engineer, Dean Booster, developed the capping machine, which now is ready for commercial testing. Fruit first is dumped into water and then fed onto several pairs of rollers which rotate in opposite directions. A jet of water pointed up the rollers keeps fruit with stems and caps from rolling down the slanted surface. When the cap or stem finally is caught between the rollers, the fruit pops off. Fruit without caps or stems rolls freely through the water jets onto a conveyor.

"In 1967, industry representatives said if 50 per cent or more fruit were recovered by mechanical harvesting, it would be a success," Booster said. "This year we mechanically harvested, stemmed and capped 58 strawberry selections. From 10 of the selections we recovered 90 per cent or more fruit."

Pennies per day replace lots of hay

Wintering cows have something new on their menu.

Their owners, too, have something to look forward to: more feed efficiency, less hay required—and up to 15 percent savings in winter feed costs with the chance for even more.

The key to both anticipations is monensin, an antibiotic which increases an animal's production of propionic acid, a fatty acid, and reduces the amounts of two other acids without disturbing the fatty acid total.

In studies with two groups of 48 cows for two winters at the Eastern Oregon Agricultural Research Center at Burns, animal scientists Harley A. Turner and Robert Raleigh found monensin could be used to maintain gestating mature cows who wintered on meadow hay.

As a feed supplement, monensin could turn on smiles of hay-hungry beef producers all over the Northwest. The biologically active compound not only reduces food intake without a reduction in the daily gain of feedlot cattle but also increases gains of pasture-fed cattle, said the scientists.

"We know from our previous studies that monensin used as a feed supplement doubled average gains in overwintering cattle," said Turner.

"But we also feel that by feeding monensin we can cut back on the amount of hay fed and still get the weight gains we are seeking with low quality roughage."

There were no differences in conception between the test and control animals and calving records

showed there was only a slight difference in calving interval between treatments with monensin supplemented cows calving sooner.

Is monensin expensive?

"In our studies we spent 1 to 1 1/2 cents a day per cow on monensin," said Turner. "We fed it with ground barley, starting with one pound a day and cut that to half-pound, feeding 200 milligrams of monensin a day."

Intake of monensin is important so barn feeding on an individual basis was used in the Experiment Station studies. Roughage intake also is important.

"Monensin could be put in liquid feeds but intake controls have to be maintained," stressed Turner.

The Federal Drug Administration has cleared a commercial form of monensin for use with beef cattle in confinement including use on the day of slaughter but has not cleared it for pasture or cow herd use.

Turner and Raleigh will do dosage and toxicity studies on 96 head of cattle this winter as part of the effort to get FDA approval for monensin for mature cow use.

"Next year, we will feed one group of animals monensin and hay and only hay to another group so we can see what limiting hay intake does," said Turner. "We also may look at feeding straw or poorer feeds with monensin, and thus reduce or eliminate the need for additional supplements."

How much feed cost did monensin save in the studies?

"Reduced meadow hay requirement for 180 days (November to April) can save about $25 in winter hay costs," said Turner. "The bill for barley and monensin for the same period would be about $4.50."

Pleased with results of their studies which indicate that monensin's feed conversion improvement could mean substantial savings in feed for wintering cows, Turner and Raleigh are excited about another possibility.

By using both monensin and growth stimulants (some of them implanted in ear skin), growers may be able to get as much as 25 percent increase in average daily gain on the same amount of feed.

And that, the scientists agree, is nice anticipation.

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