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COVER: Oregon crab fishermen are eyeing a long-line crab-fishing system adapted by an OSU researcher from gear used on the East Coast. For a report on this system and its advantages over present gear, turn to page 8.

Photo: W. Q. Wick



OSU research pinpoints

Chemical controls for cheatgrass in wheat

by D. J. Rydrych *Assistant Professor of Agronomy*

"KING CHEATGRASS" no longer reigns unchallenged in the wheatfields of Oregon and the Pacific Northwest.

Research at OSU's Pendleton Experiment Station has pinpointed four chemical compounds which range up to 90% effective in controlling cheatgrass in winter wheat. One of the compounds already has been registered for this use and registration procedures have been initiated for the others. The compounds include two soil-incorporated materials, a post-plant pre-emergence material, and a post-emergence material.

Cheatgrass, also known as downy brome, first appeared in the Pacific Northwest only slightly more than a century ago. However, because of its remarkably rapid adaption, this weed today infests an estimated three million acres of cropland in Oregon, Idaho, and Washington, as well as many millions of acres of rangeland.

Moldboard plowing

For many years, cheatgrass was not a significant problem in wheatfields because the practice of moldboard plowing kept the weed in fairly close check. It soon became one, though, when tillage practices were changed in order to conserve soil moisture and reduce soil losses from wind and water erosion. Widespread adoption of nitrogen fertilizers and broadleaf herbicides during the late 1940's further aggravated the situation, and by the mid-1950's, cheatgrass had become firmly established as the wheat grower's number-one weed problem.

Ever since that time, OSU researchers have been seeking satisfactory chemicals for cheatgrass control. Many hundreds of compounds have been screened at the OSU campus and the most promising of these subjected to field evaluations at the Pendleton Experiment Station. This long effort began to bear fruit in early 1968, at which time we had on hand five compounds that had proved effective on cheatgrass through at least two years of field testing. Since then, four of these compounds have fully demonstrated their effectiveness. The compounds are Treflan, Planavin, CP52223, and R11913.

Registered for use

Treflan was registered for use on cheatgrass in winter wheat in May of this year. Planavin is expected to receive registration for the same use within one or two more seasons. Both of these compounds must be shallowly soil-incorporated prior to seeding. Thus, seedbeds must be free of straw residue and large clods, and soils must not be subject to wind erosion. Treflan is not as selective in winter wheat as Planavin, but tolerance can be improved by seeding the crop below the chemically treated zone. Treflan also is somewhat more volatile than Planavin. Both materials are ineffective on mustards and other broadleaved weeds, so supplemental controls must be applied for these species. Treflan and Planavin have proved from 60% to 80% effective

on cheatgrass when applied at a rate of 0.75 pounds per acre.

CP52223 is effective chiefly as a pre-emergence soil-surface treatment. It has good wheat selectivity and has proved 60% to 70% effective on cheatgrass at a rate of 2 pounds per acre. The compound also is mildly effective on some broadleaved weeds, though the use of supplemental materials usually is necessary. CP52223 is primarily a grass herbicide and is applied prior to cheatgrass germination. Because it has little foliar activity, the compound can be applied on wheat that has emerged. However, it must be on the soil surface before cheatgrass has germinated in order to be effective. Soil type does not appear to influence the compound's activity.

Post-emergence compound

R11913 is a post-emergence, carbamate compound that has given consistent cheatgrass control over the past four seasons with good to fair wheat selectivity. It is applied in late fall or early spring before cheatgrass has developed beyond the one- to three-tiller stage. Like most post-emergence herbicides, R11913 is versatile and can be used on most soil types. The compound also will control a wide variety of broadleaved weeds if applied when these weeds are very small. Thus, in some seasons, one application of R11913 may be sufficient to control all weed species. In wet years and for some broadleaved weeds, though, the compound may need (continued on pg. 16)

A 30-ton temporary
silo can be built with
less than \$40
worth of materials

Do-it-yourself silo for less than \$40

LESS THAN \$40 worth of materials can readily be transformed into a successful temporary silo with capacity for 30 tons of grass silage. That's the report from D. W. Claypool, superintendent of OSU's John Jacob Astor Experiment Station near Astoria.

The silo, actually a sealed plastic bag from which the air has been pumped, has been tested at the Astor Station for the past three winters. Throughout each test, it has held good-quality, well-wilted forage at high acceptability and less than 50% moisture. Indeed, when properly constructed, the silo's performance is considered equal to that of many permanent silos, as well as that of similar 50- to 100-ton plastic bags built from kits generally costing \$250 or more.

Materials needed

Materials needed for the silo are: one 20- by 100-foot roll of 6-mil polyethylene sheeting; two 50-foot rolls of 2-inch, all-purpose polyethylene tape; 140 feet of $\frac{1}{2}$ -inch plastic pipe; 140 feet of 7/16-inch flexible garden hose; 30 feet of $1\frac{1}{2}$ -inch plastic pipe; eight 4- by 8-foot sheets of $\frac{3}{4}$ -inch plyboard; and thirty-six 6-foot lengths of 2- by 4-inch lumber.

To construct the silo, the polyethylene sheeting is cut into one section 40 feet and two sections 30 feet in length. The two 20- by 30-foot sections will be used to make the silo's top sheet. The 20- by 40-foot section serves as its bottom sheet and, as shown in Figure 1, should be spread out on a bed of old straw or hay deep enough to protect the plastic from puncture by stubble or rocks.

The plyboards, which are used for the silo's temporary sides, are laid end-to-end along the bottom sheet as shown in Figure 2. As indicated, the plastic should extend 2 feet beyond the outside edges and 4 feet beyond the exposed ends of the plyboards. The outer 2 feet of plastic is folded over the plyboards so that temporary vertical supports can be installed. For these supports, 24 of the 2-by-4's are driven at least 6 inches into the ground at the positions marked "x" in Figure 2. As indicated, three 2-by-4 supports are used for each sheet of plyboard. The plyboards are raised on edge and nailed at the top to the 2-by-4's. In this operation, the outer 2 feet of plastic should be carefully straightened between the plyboards and 2-by-4's to avoid rips or creasing. The sides are angle-braced, as shown in Figure 3, with the 12 remaining 2-by-4's.

The silo is now ready for loading. Claypool notes that the first few loads of forage should be evenly spread over the bottom sheet, as shown in Figure 3, to protect it from the wheels of off-loading trucks or wagons. Thereafter, off-loading vehicles can be driven directly into the silo and unloaded until the stack of forage is 4 feet above the sides of the plyboards.

Trench is formed

When loading is completed, a trench at least 18 inches deep and 25-plus feet long is formed along the top of the forage. The trench should be started at one end and centered between the sides of the silo. The 30-foot length of $1\frac{1}{2}$ -inch plastic pipe is plugged at one end,

heavily perforated with $\frac{1}{8}$ -inch holes to within 5 feet of the other end, and positioned in the trench so that its non-perforated end extends beyond the forage stack. The trench is completely filled with forage to prevent contact between the perforated section of the pipe and the silo's top sheet.

Sections are joined

The two 20- by 30-foot sections of plastic sheeting are joined together with the polyethylene tape to form the silo's 30- by 40-foot top sheet. The tape should be applied to both sides of the sheeting to assure a strong, airtight seam. This operation, Claypool notes, is eased considerably if a small piece of plyboard is used as a working surface and moved along under the plastic sheeting as the tape is applied.

The top sheet is spread over the stack of forage with the taped seam midway between and parallel to the ends of the silo. A small X-shaped opening is cut where appropriate in the top sheet and the nonperforated end of the $1\frac{1}{2}$ -inch plastic pipe fitted through. The opening is sealed around the pipe by means of adjustable hose clamps and plastic tape, as shown in Figure 4. The tape also is used to seal any accidental tears or punctures in the plastic sheeting.

The silo's top and bottom sheets are now ready to be sealed together. A $\frac{1}{4}$ -inch-wide strip is cut from the entire 140-foot length of $\frac{1}{2}$ -inch plastic pipe. This pipe serves as the shell of the seal. The 140 feet of 7/16-inch garden hose, which usually is available in 25- or 50-foot lengths, acts as the seal's core. The seal is formed by folding the



Figure 1

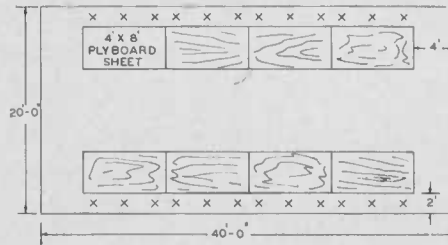


Figure 2



Figure 3



Figure 4



Figure 5



Figure 6

edges of the top and bottom sheets around one side of the hose, as shown in Figure 5, then forcing both into the center of the $\frac{1}{2}$ -inch pipe.

Bullet-shaper spreader

Claypool points out that a bullet-shaped spreader, made from a short piece of $\frac{3}{4}$ -inch dowling and equipped with a swivel handle, greatly speeds the sealing operation. As shown in Figure 5, the spreader will widen the gap in the $\frac{1}{2}$ -inch pipe sufficiently that the hose and plastic sheets can readily be inserted. To advance the spreader, the swivel handle is turned parallel to the pipe and pulled.

Sealing should begin at one corner and proceed first across one end of the silo. As the operation progresses along the silo's sides, the plyboards are removed one at a time and just ahead of the seal in order to prevent the forage

stack from sagging. Supports and braces also are removed. The end of the seal should overlap the beginning by at least 4 feet to assure an airtight closure.

As shown in Figure 4, when the seal is completed, a vacuum pump is connected to the exposed end of the $1\frac{1}{2}$ -inch plastic pipe and entrapped air pumped from the silo. The type of pump shown is widely used in milking machine installations and, on a properly sealed silo, will pull 12 to 15 inches of vacuum within one hour. Such vacuum pumps often can be leased or rented from firms which supply polyethylene sheeting.

Figure 6 shows a filled silo on which 15 inches of vacuum has been pulled. This amount of vacuum results in an atmospheric pressure on the silo of approximately 225 pounds per square inch, sufficient to compress the forage

load to about half of its original height. Pumping should be continued for about two hours after maximum vacuum is achieved. The pump is then disconnected, the end of the $1\frac{1}{2}$ -inch pipe plugged, and a thin layer of wet straw or shavings placed over the top of the silo to protect against tears or punctures.

Pressure equalizes

Over time, pressure within the silo will equalize with outside pressure due to slow air leakage. However, Claypool points out, this will not appreciably affect the quality of its contents, since air initially entrapped in the forage already has been removed. When the silage is needed, the seal is removed from one end of the silo and the top sheet folded back as far as necessary. Once the seal is broken, of course, the silage should be used as rapidly as possible.

OREGON'S MILLION-DOLLAR walnut industry has overcome a serious threat by putting OSU research findings to work.

The threat arose four years ago, when food regulatory agencies seized the first of several shipments of walnut meats due to the presence of a small bacterium known as *Escherichia coli*. This bacterium, a common inhabitant of the large intestines of warm-blooded animals, normally is harmless to humans. However, its presence on food is strong evidence of an exposure to animal excreta. Such exposure, whether direct or indirect, is not only esthetically intolerable, but potentially dangerous. For it offers an opportunity for contamination by other bacteria that, while less common in animal intestines than *E. coli*, are very hazardous to humans—for example, *Salmonella*.

Problem was widespread

So OSU food scientist P. H. Krumperman tackled the problem. He soon discovered that *E. coli* could be detected on nearly all of the walnut meats

Decontamination techniques beat down a bacterial threat

being packed in the state—even those from the cleanest shelling and packing plants. Thus, it seemed likely that the contamination was occurring prior to this point of operations.

A survey of practices at the orchard level was then conducted. This survey indicated that in smaller walnut orchards, animal manures often were used for fertilizer and animals frequently pastured during winter months. Soils in such orchards were found to have high counts of *E. coli*. In larger orchards, on the other hand, where manure applications and pasturing were rare, soil counts of *E. coli* generally were low.

The source of the contamination was now apparent. And the means of distribution? Krumperman explains, nuts initially free of *E. coli* were becoming contaminated at drying plants when mixed with those already bearing the bacterium. Most nuts, therefore, were contaminated before delivery to shelling and packing plants.

Safe, effective, feasible

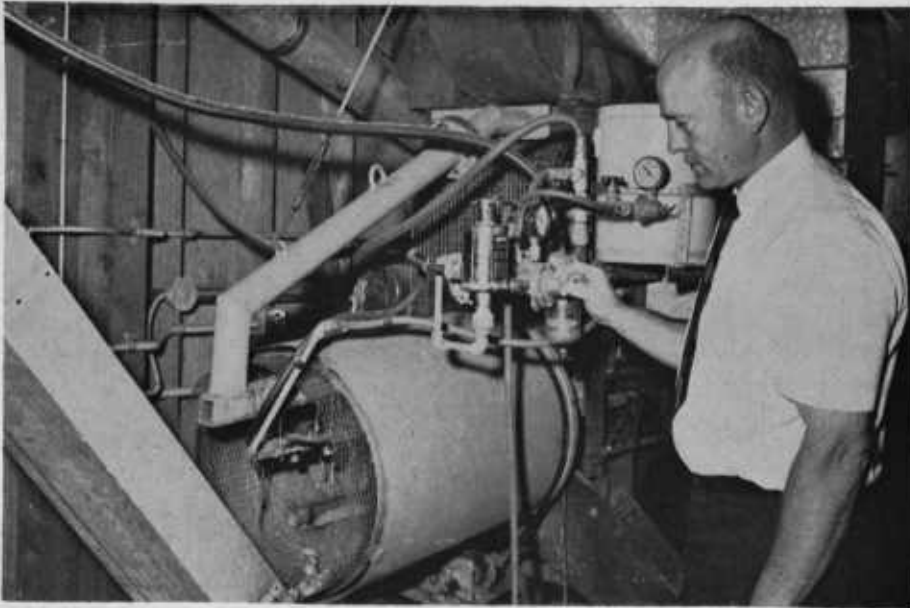
As a first step, orchardists were encouraged to discontinue pasturing and application of manure. Dryers were asked to improve their sanitation practices in general and to avoid mixing batches of nuts from different orchards. To assure solution of the problem, however, decontamination techniques needed to be developed for use by shellers and packers. The techniques had, of course to be safe in terms of human health, effective, and economically feasible. They also had to do the job without significantly increasing moisture levels—a very difficult requirement.

After two years of intensive research, Krumperman developed two "dry" decontamination techniques that meet all those prerequisites. The first technique involves the application of a mist containing 2,000 parts per million of sodium hypochlorite to the dry, in-shell nuts as they are brought into the shelling plant. The mist greatly reduces the number of bacteria and other microorganisms on the surface of the nutshells, yet leaves no measurable residue. As well, it significantly lowers the level of contaminated dust circulating in the plant.

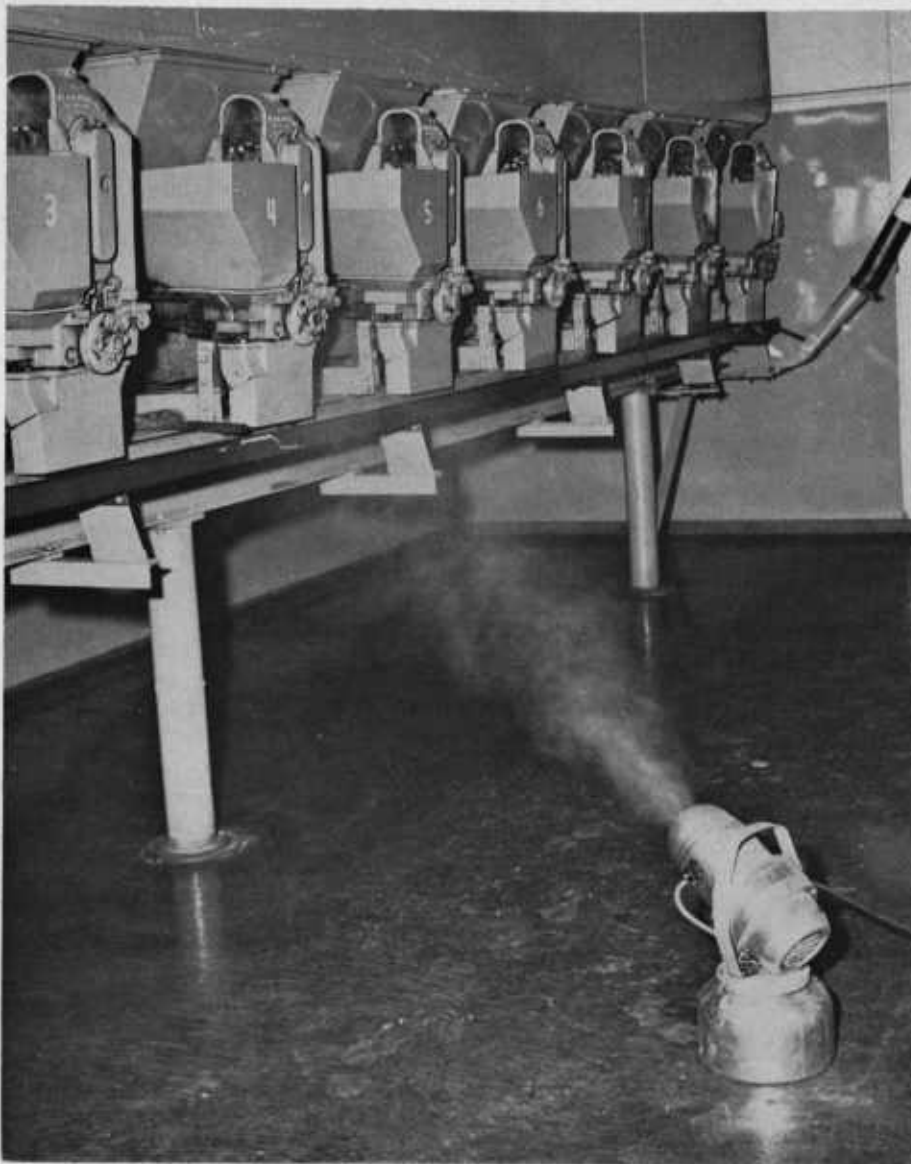
The second technique, which also leaves no measurable residue, consists of releasing an iodine aerosol fog several times per day into cracking, sorting, and packaging rooms. The fog is easily dispersed throughout these critical areas and is very effective in reducing microorganisms in the air and on room and equipment surfaces.

Quality much improved

Use of these techniques, plus increased sanitation efforts at all levels of the walnut industry, have greatly improved the quality of Oregon walnut meats. Indeed, Krumperman points out, there has not been a seizure of this product for the past two years. The threat, it seems clear, has been beaten down.



Krumperman checks unit used to apply mist to dry, in-shell nuts as they are brought into packing plant.

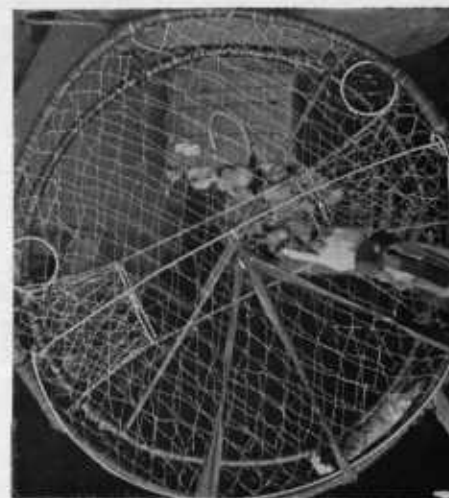


Aerosol fog is dispersed into cracking room. Treatment is very effective in reducing microorganisms.

Fisher, right, and two crab fishermen examine pot designed for use with long-line system.



Near right: snap and short line known as "gangeon" used to connect pots to groundline. Far right: vertical view of smaller, lighter crab pot.



Improved crab fishing system worked out

AN IMPROVED SYSTEM of crab fishing has been worked out by an OSU fisheries researcher.

It's called the long-line system. And, reports R. B. Fisher, it opens up waters not fishable with present gear, costs less, and can be operated at least as fast.

Oregon fishermen presently use large, individual pots to catch crab. Each of these pots must be equipped with an 80- to 100-pound weight, a line running from the pot to the ocean surface, and a buoy. The long-line system, on the other hand, which Fisher adapted from the gear used by East Coast lobster fishermen, employs a single anchored groundline to which as many as 15 crab pots are attached.

Thus, as shown in the accompanying sketch, only two sets of buoys and two buoy lines are required. And pot weights are not needed because the groundline is anchored. In addition, lighter and smaller pots can be used—pots that cost \$22 to \$26 apiece, compared to a cost of about \$45 for a completely rigged individual pot. Because of these savings, Fisher believes, total per-pot costs for long-line systems would average about half as much as for individual pots.

10 pots in 10 minutes

An experienced crew normally can tend from 50 to 55 individual pots per hour. In trials conducted recently off Yaquina Bay, an inexperienced crew consistently tended a 10-pot long-line system in 10 minutes. The system also may eliminate the need for a helmsman, since the boat need not be steered to individual pots. Instead, the boat could be guided by the captain at the power

block by means of remote steering and engine controls.

The basic procedure for setting a long-line system is as follows: One set of buoys is let overboard, the anchor bent on, and baited pots snapped onto the groundline as it is run out. When the other end of the groundline is reached, the other anchor is bent on, the line pulled tight and straight, and the other set of buoys let overboard.

Running the system

In running the system, one set of buoys is taken aboard, the line is fed into the power block, and the pots are raised. As full pots are boarded, they are unsnapped from the groundline and replaced immediately with rebaited pots which are let back overboard. When all pots have been tended, the line is once again pulled tight and straight. (A detailed report on the rigging and running of long-line systems is now being prepared for distribution to fishermen.)

Perhaps the greatest advantage of the system, the OSU researcher points out, is that it can be used in waters which, for various reasons, are not fishable with individual pots.

The use of individual pots is not economically feasible in deep waters, for their retrieval takes too much time and labor and the buoy-line costs involved are too high. Long-line systems can be fished economically in very deep waters because this does not appreciably increase pot-retrieval time and because only two buoy lines are needed.

Individual pots, even though they are weighted, cannot be used in shallow waters, for heavy surf will throw them up on the beach. A long-line system

can be fished in very shallow waters because anchors hold far better than weights and because waves have very little buoy line to work against.

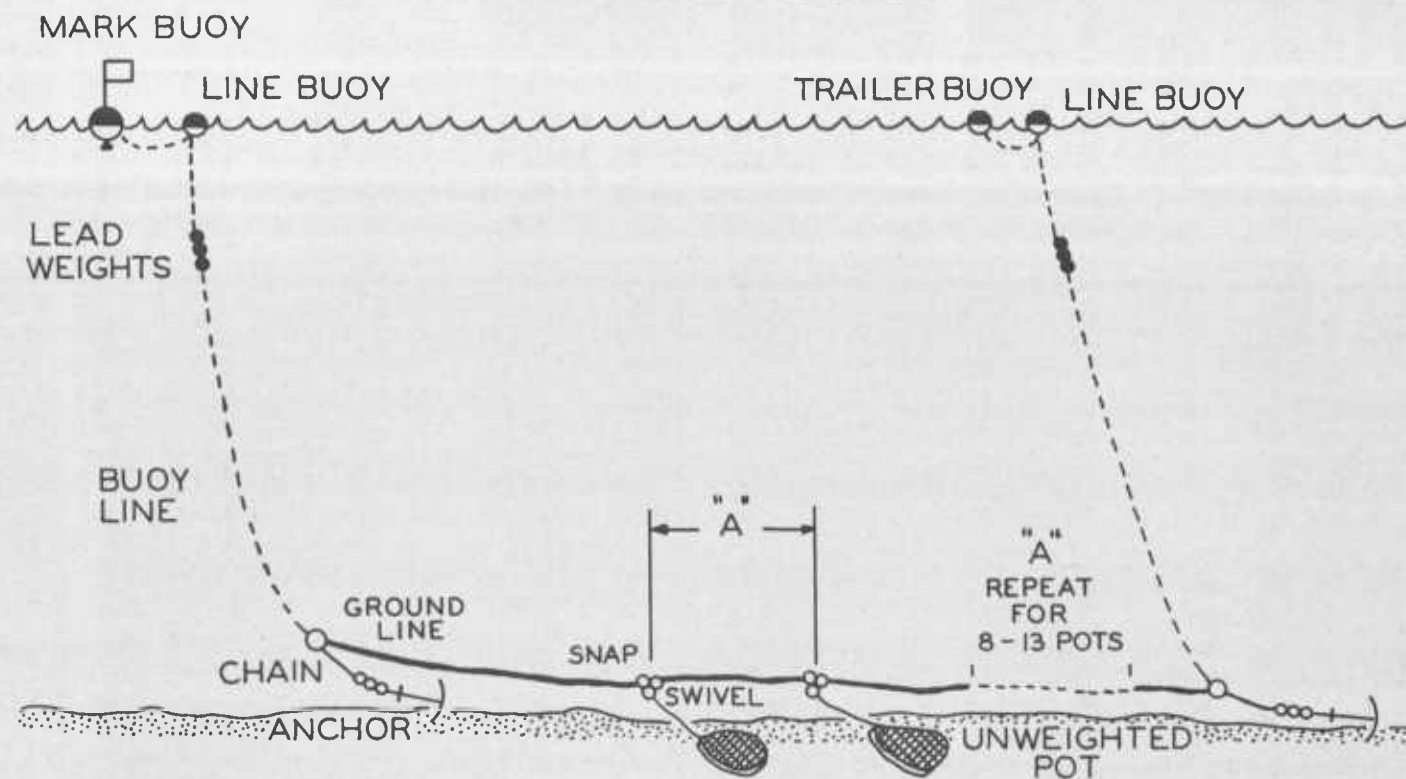
As well, weighted individual pots cannot be used in waters where the ocean bottom is soft, for they will soon become buried. These waters can be fished with long-line systems because no pot-weights are needed and lighter pots can be used.

Even so, Fisher points out, some pots may become stuck on occasion. And if they cannot be freed from either side of the system, it is necessary to cut the groundline on both sides and attach buoys to both ends in order to go ashore for "blow-out" equipment. The stuck pots are then freed in the usual way—by running the blow-out hose down the line and blasting away the sand with compressed air.

Possible snag

Another drawback with long-line systems is the possibility that a sunken log or similar heavy object may snag the groundline in such a way that it cannot be pulled free. The maximum loss in this event, however, should be one pot, since the groundline is of greater strength than the short lines leading to each pot. Thus, the system should part at this point.

On balance, Fisher comments, the advantages of the long-line system appear clearly to outweigh its disadvantages. Fishermen seem to agree. Thus far, 15 Oregon crab-boat owners have indicated they will switch over to the system next crab season. And three crab fishermen in Washington already have started rigging long-lines.



Blacktail taste responses under study at OSU

Do BLACK-TAILED DEER prefer a sweet taste to a sour one? Are they sensitive to differences in salty tastes? Is a bitterish taste to their liking? OSU animal scientists, by answering such questions, are helping forge new tools for the management and control of Oregon's black-tailed deer herds.

For several years, D. C. Church and his associates have been studying the taste responses of cattle, sheep, and goats. This continuing work has produced much valuable information. Last year, the study was expanded to include the black-tailed deer. Here's a report on the first round of tests:

Young blacktails which had been bottle-raised by Oregon State Game Commission personnel were used as test animals. The deer were divided into four groups—two groups of bucks and two groups of does—then confined in pens. A companion test-group of female Hampshire sheep also was established to enable comparison of data on deer responses to data previously obtained on the domestic animals.

The basic testing procedure consisted of offering the deer a choice between drinking from a container of plain water and an identical container of water to which a taste compound had been added. Thus, the scientists' first major job was properly locating the two containers used for each group of deer. That is, where the animals within each group were consistently drinking about equal amounts of plain water from each container.

Statistical analysis

A statistical analysis was then conducted to determine the maximum remaining amount of influence that container location could exert on relative fluid intake. Among other things, this analysis showed that an intake of between 43% and 57% of a given taste solution clearly indicated neither preference nor rejection by the animals. Accordingly, this was called the zone of non-discrimination, while intake of 58% was designated the lower threshold of preference and intake of 42% the upper threshold of rejection. The analysis also showed that intake of 80% could be considered the upper threshold of preference and intake of 20% the lower threshold of rejection.

With these bases pinned down, Church and J. C. Crawford began ad-

ministering the taste compounds. In most cases, they started with a low concentration and gradually increased it until intake dropped below the lower threshold of rejection. With some compounds, though, it proved necessary to use descending concentrations in order to assure that the zone of nondiscrimination had been reached.

Tastes, compounds tested

Tastes and compounds tested were: sweet—glucose, sucrose, and saccharine; sour—acetic, butyric, and hydrochloric acids; bitter—quinine sulfate and quinine monohydrochloride; salty—sodium chloride and sodium acetate. The principal results:

The deer showed a very strong preference for the sweet-tasting solutions. Indeed, higher concentrations of glucose and sucrose stimulated intakes beyond the upper threshold of preference, the only compounds to do so. A preference also was shown for saccharin over a wide range of concentrations, though it was much less marked than that shown for the two sugars.

Both bucks and does showed fairly strong preferences for acetic acid solutions, though responses were somewhat erratic. In general, however, does showed a greater preference for this compound than bucks. Responses to butyric acid solutions also were somewhat erratic, but no definite preference was indicated for this compound. A slight preference was shown for the lowest concentration of hydrochloric acid offered the animals. Differences in odor appeared to have considerable effect on responses to all of the sour-tasting solutions.

Bucks and does showed rather marked differences in response to the bitter-tasting solutions. The intake of bucks indicated a moderate preference for low concentrations of both quinine compounds. Does' intake of these solutions, on the other hand, never rose beyond the zone of nondiscrimination.

Intake reduced

The deer showed a slight preference for sodium acetate solutions over a relatively wide range of concentrations, though bucks discriminated at lower concentrations and consumed higher percentages of these solutions than does. Neither sex, however, showed a

preference for any of the salty-tasting solutions containing sodium chloride, and even moderate concentrations of this compound reduced intake below the lower threshold of refusal.

Definite preferences

Adding up the results, Church and Crawford conclude that either one or both sexes of black-tailed deer possess definite preferences for sweet, sour, and bitter tastes—in that order. At least some salty tastes, however, clearly are not preferred. Compared to the domestic animals under study, blacktails showed fewer definite preferences and less taste sensitivity than goats, but

more preferences and greater sensitivity than cattle or sheep.

Such knowledge, the OSU animal scientists point out, can be put to work in a number of ways.

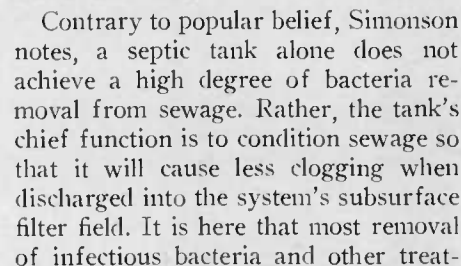
Some examples: in the development of taste stimulants that would overcome the blacktail's frequent rejection of emergency winter feedings; in the formulation of taste repellents that would effectively curtail blacktail foraging in tree plantations, crop planting, nurseries, and residential gardens; in the selection of strains of forest seedlings that are less to the blacktail's liking and, therefore, less susceptible to blacktail browse damage.



**Taste research is
priming the development
of new tools for the
management and control of
black-tailed deer**

*Blacktail buck
chooses plain water
over water containing
low concentration of
sodium chloride.*

Soils and septic-tank systems





Simonson collects sample of heavy clay soil from cutbank. Filter fields normally do not perform acceptably in such soils due to insufficient percolation rate. Opposite page shows basic soil map for area of approximately 2,500 acres. Numbers identify soil types within each map unit. Hence, limitations of the soil in each unit can be determined.

ment of septic-tank effluent is accomplished, primarily by percolation through the soil. Once filtered out, the infectious bacteria eventually die. Some bacteria also are eliminated by physical forces that occur during percolation.

System failure

The failure of a septic-tank system serving a more isolated individual dwelling often can be alleviated, though at considerable expense, by relocating or expanding the filter field. With increases in home density, however, these options may cease to be available. If so, the foul odors and other forms of pollution associated with inadequate filter fields often affect immediate neighbors and can become a serious community health hazard.

Such problems already have occurred in some of Oregon's more rapidly populating areas. In an effort to prevent their further occurrence, Simonson and other OSU soil scientists, in cooperation with personnel of the U.S. Department of Agriculture's Soil Conservation Service, have been assisting local officials in several ways. These include

the summarization of existing soils information, the collection and mapping of information on previously unsurveyed soils, and training in the prediction of filter-field performance based on this information.

Certain soil conditions are essential if filter fields are to perform satisfactorily. The most important of these conditions, Simonson points out, are:

¶ Good drainage with no seasonally high water table. Most soils in western Oregon dry out in the summer and lack a permanent water table. However, many of these soils become waterlogged during winter months.

¶ Low flooding hazard. Sites not subject to flooding are recommended. Sites with an average flooding frequency of one flood in five years might be considered acceptable strictly in terms of filter-field performance, but they have other obvious drawbacks.

Adequate depth

¶ Adequate depth for filter-field installation and absorption of septic-tank effluent. A depth of 6 feet or more to

bedrock or other impervious strata is recommended.

¶ Ability to transmit and absorb septic-tank effluent at an adequate rate. A percolation rate of more than 1 inch per hour is recommended. As rates increase, the size of the filter field can be reduced. (Most counties now require that percolation rates be tested prior to issuing building permits for sites dependent on septic-tank systems.)

¶ Favorable topography. Slopes steeper than 10% or 12% place severe limitations on filter field performance.

Statewide survey

Many other matters of equal significance cannot be accurately predicted or properly resolved unless adequate soils information is available to city, county, regional, watershed, forest, agricultural, and other planners. In addition to their more localized efforts, OSU and SCS personnel are engaged in a cooperative statewide soil survey. The information obtained, Simonson points out, will be essential if sound planning for the use of all of Oregon's land resources is to be achieved.

research briefs

Channel catfish production not yet a sound venture

WILL COMMERCIAL production of channel catfish pay off in the Willamette Valley?

Not at this point, reports OSU fish biologist C. E. Bond. The reason: Water temperatures in the area drop sufficiently low that yearling channel catfish cannot presently be grown to marketable size in one growing season. In many southern and midwestern states, on the other hand, 4- to 6-inch yearling channel cats are readily grown to a market size of 14 inches and three-quarters of a pound in 180 to 220 days.

Several years ago, Bond and his associates tested yearling channel catfish in fertilized ponds. Less than 2% of the fish were of marketable size at the end of the growing season, which had been relatively warm. Last year, another experiment was conducted to see if feed supplementation was the answer. Yearling channel cats, planted in ponds at the rate of 1,000 fish per acre, were fed two types of pellets at three different levels for 150 days.

145 pounds per acre

The outcome: None of the fish reached a good marketable size. The fish grew well when water temperatures were above 70 degrees, but began to lose weight when temperatures in the ponds dropped below 50 degrees. Production was only about 145 pounds of fish per acre. By way of comparison, channel catfish yields in the Midwest



Cage-feeding of channel catfish is being tried in this experimental pond to see if market-sized fish can thereby be produced in a single growing season.

Excellent weed control often is achieved in Malheur County onion fields at \$60-per-acre saving through use of chemicals found suitable in OSU tests.



and South are reported to be 700 to 2,000 pounds per acre at stocking rates of 1,500 to 5,000 yearling fish per acre.

Clearly, Bond points out, unless a means of increasing efficiency can be found, it will take two growing seasons to bring yearling channel cats to good marketable size in the Willamette Valley—even with feed supplementation.

Intensive method

In search of that efficiency increase, the OSU fish biologist and his associates are currently testing an intensive method of producing channel cats which involves confining the fish in cages and feeding them daily. In addition, the brown bullhead, a close relative of the channel catfish and also a desirable market fish, is being evaluated. Meanwhile, Bond concludes, commercial production of channel catfish in the Willamette Valley cannot as yet be considered a sound business venture.

Weed-control costs reduced for onion growers

OSU RESEARCH is helping Malheur County onion growers save some \$60 per acre in yearly weed-control costs. And, reveals agronomist L. A. Fitch of the Malheur Experiment Station near Ontario, even greater savings may be possible.

Onions grow slowly

Keeping weeds under control in onion fields is extremely difficult, for onions not only germinate and grow quite slowly, but never produce much shade. Until the mid-1950's, the only means of defense was an ever-more-costly combination of hand-weedings and cultivations. Then, herbicides and, a few years later, fumigants began to be introduced for use on onions. So OSU scientists launched continuing tests to learn how and which of the various compounds available could safely and successfully be employed under Malheur County conditions.

The report from growers: Thanks to the use of herbicides and fumigants found suitable in these tests—particularly a pre-emergence herbicide known

as DCPA (Dacthal) — weed-control costs currently are averaging about \$60 per acre less than if weedings were done strictly by hand and cultivator.

Problems yet to solve

However, Fitch points out, some problems remain to be solved. Several weed species are relatively tolerant of DCPA and thus tend to survive treatment. DCPA's effectiveness also is greatly influenced by a wide variety of variables, such as temperature and soil moisture. And while fumigants, which are applied primarily to check soil-borne diseases, do significantly reduce the number of viable weed seeds in the soil, they do not help check weeds that germinate along with or after the crop.

Current search

Thus, Fitch and other OSU researchers are now in search of post-emergence herbicides that can safely be applied to growing onions to control weeds that escape DCPA treatment and fumigation.

Among the most promising candidates located to date are chloroxuron (Tenoran) and 2,4-dichlorophenyl 4-nitrophenyl ether (TOK E-25). Both of these post-emergence herbicides have recently received registration for use on onions. However, Fitch cautions, at least another season's testing of their performance under local conditions is needed. Also under investigation are two experimental post-emergence herbicides that have thus far shown a high degree of effectiveness on a wide spectrum of weeds, as well as a high margin of safety. If any one of these compounds proves suitable, it should be possible for Malheur County onion growers to cut yearly weed-control costs even further.

Beef-packing plant considered by economists

ESTABLISHMENT of a beef-packing plant in central Oregon has been recommended by OSU agricultural economists . . . assuming that supply and

market conditions in the area will not change significantly when a new slaughtering facility under construction in southeastern Washington goes into operation early next year.

The economists, J. G. Youde and G. W. Huettig, also advise that the plant be designed for processing of between 25,000 and 50,000 head per year, and that kill-floor method be chosen according to anticipated kill rate. That is, if the rate is expected to be less than 20 head per hour and is not expected to exceed that level in the future, use of a bed-type facility is suggested. However, if it appears that the rate is often likely to exceed 25 head per hour, use of an on-rail facility is advised.

The recommendations are based on information gathered during 1969 and early 1970. A detailed report on the prospects will be issued in the near future. Meanwhile, here are some of the particulars:

Hourly volume

¶ Hourly volume of the plant could be expected to vary from a low of 10 head to a high of 50 head. Monthly volume would likely range from a low of 1,600 head in June to a high of 7,500 head in August.

¶ Representatives of the meat-packing industry estimate that the plant could procure from one-fourth to two-thirds of the fed cattle produced in central Oregon. The OSU economists note that fed-cattle production in the area is expected to be 30% more in 1972 than in 1968.

Interest expressed

¶ Two of the four major retailing firms and one of the major beef-purveying firms in Oregon have expressed considerable interest in obtaining carcass beef from a packing plant located in the central Oregon area. As well, a meat-wholesaling firm in northern California has indicated that it would strongly consider purchasing approximately 10,000 carcasses per year from the plant.

Youde and Huettig point out, however, that conditions in today's meat-packing industry can change extremely rapidly. Hence, they suggest that those who might be interested in establishing such a plant proceed cautiously until the effects of the Washington operation are known.

(continued from pg. 3) help from a broad-leaf herbicide. Several techniques have been developed at the Pendleton Station by which the wheat selectivity of R11913 can be improved. Since it is a post-emergence herbicide, R11913 can be used on seedbeds of all types. It thus would be particularly useful with a trashy-fallow soil conservation system. The compound has proved 70% to 90% effective on cheatgrass when applied at rates of from 2 to 3 pounds per acre.

Newer candidates

Several newer candidates for cheatgrass control are now being tested at

“... a typical cheatgrass population, if unchecked, reduces winter wheat yields by an average of 35%.”

the Pendleton Station. Most of these compounds are of the pre-emergence type, though a few have shown good post-emergence activity. Considerable emphasis is being placed on the testing of post-emergence herbicides, for materials of this type are needed for control of cheatgrass in trashy-fallow systems.

It is likely to be quite some time before any of these newer compounds can be expected to receive registration for use in winter wheat. No compounds have been found to date that wheat will tolerate completely. The four compounds discussed above are considered moderately tolerant to wheat. Most of their wheat selectivity is obtained through soil placement or systematically timed application.

Life cycle crucial

The life cycle of cheatgrass is a crucial matter in the search for satisfactory chemical controls. For example, it is known that at least 90% of all cheatgrass seeds located in moist soils at a shallow depth will germinate one year after seed drop. Two years after seed drop, viability of seeds thus located has dropped to around 2%. And by the third year, seed viability has virtually disappeared. The seeds that survive the

second year normally are found in the 4- to 12-inch soil profile.

It also has been learned that cheatgrass is least aggressive during the one- to three-tiller stage of development, which can be attained in early fall and spring. After the weed has developed six or eight tillers, it becomes very aggressive and resistant to chemicals. In view of such characteristics, there seems little question that the prospects for satisfactory chemical control are best from pre-emergence through the one- to three-tiller stage.

Recent studies at the Pendleton Station have shown that a typical population of 10 to 15 cheatgrass plants per

square foot continuously reduces wheat yields if left unchecked. Indeed, yields ultimately are reduced by an average of 35%. During most seasons, however, significant yield reduction does not begin until after February or March. Thus, there is a long period of time available—from pre-emergence in the fall through early tillering in the spring—during which the application of a suitable chemical would remain economically sound.

Expensive, but . . .

Controlling cheatgrass with the four compounds discussed above is, to be sure, an expensive proposition. Their cost alone currently ranges from \$3.50 to \$7 per acre, and the use of broadleaf herbicides is essential with at least two of the materials. Nor are any of the compounds 100% effective on cheatgrass. But all are efficient enough to provide a return if used properly. Furthermore, their use, combined with a chemical fallow system, eventually could eliminate the reservoir of cheatgrass seed in the soil.

With one cheatgrass compound registered, it is clear that the “King” no longer reigns unchallenged. And his dethroning could be just around the corner.



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