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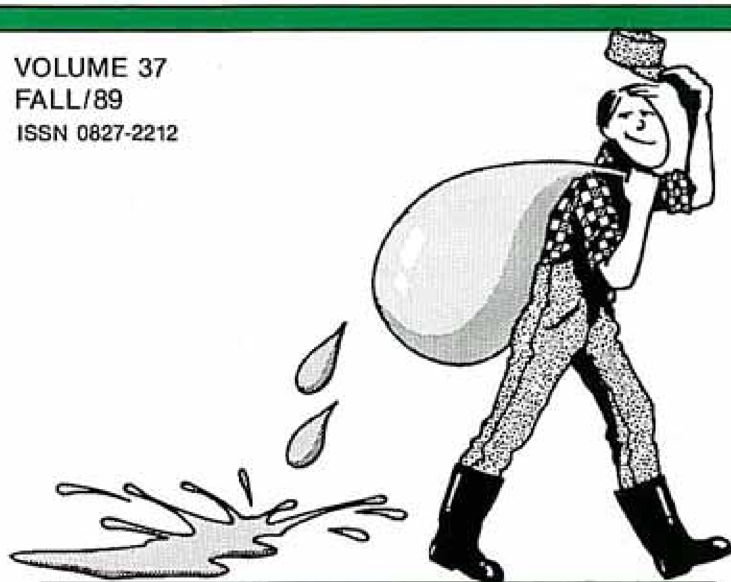

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SONAR EVALUATED FOR AQUATIC WEED CONTROL

More Research Required Before Licensing

Over the past year, researchers have been evaluating the effects of a new aquatic weed control herbicide called Sonar®, which was applied to a canal near Vauxhall. The project is a cooperative effort involving Elanco Products Company, Alberta Environment, Agriculture Canada, and the Bow River Irrigation District.

Sonar, which contains fluridone as the active ingredient, was recently approved in the United States for the control of aquatic weeds in lakes, ponds, reservoirs, ditches and irrigation canals. Sonar is not, at this time, approved for use in Canada, as research is required to determine how it can be used under Canadian conditions.

Affected plants turn white. Only 10% of the cattails and reed canarygrass showed any sign of injury.

Fluridone inhibits the plant's ability to make food, says Bill McGregor, a research specialist with Elanco Products Company. Without that ability, the plant dies. Specifically, fluridone inhibits carotenoid synthesis. Carotenoids (yellow pigments) are an important part of the plant's photosynthetic (food making) system. These yellow pigments protect the plant's green pigments (chlorophyll) from photodegradation (decomposition by sunlight). When carotenoid synthesis is inhibited, the chlorophyll is exposed to photodegradation and is gradually destroyed.

As a plant's chlorophyll decreases, so does its capacity to produce carbohydrates through photosynthesis. The visual system of fluridone action is bleaching or the development of chlorosis on the terminal bud or growing points of the plant, adds McGregor.

In the U.S., Sonar is applied to impounded water in irrigation canals when aquatic weeds are actively growing. The treated water must remain impounded for at least 7 days to allow for herbicide uptake by the weeds.

With Alberta's short season and continual water demand, it is not feasible to impound water within canals for 7 days during the period of active aquatic weed growth. As a result, investigators decided to try applying Sonar to a canal bottom after shutdown in the fall. The idea is that the herbicide — which remains active in the soil over several months — will move into the soil profile over the winter and spring and be available for rooted plant uptake during the following growing season.

Sonar 5P (5% fluridone pellet) was applied to the bottom of Lateral H1 of the Bow River Irrigation District (BRID) on October 25, 1988. A total of 3.4 kg of the pelleted formulation (0.17 kg of fluridone) was applied to 3 plots each measuring 50 m x 5 m (this corresponds to an application rate of 45 kg Sonar 5P per ha or 2.25 kg fluridone per ha).

The pellets were applied to the canal bottom by the use of a hand-held Whirlybird® seeder/fertilizer spreader. For each plot, the applicator walked down the centre of the canal spreading 50% of the required amount of material (total of 1.125 kg Sonar 5P per plot), then repeated the sequence applying the remaining 50%. The seeder delivered 0.9 kg of product per minute over a swath of about 5 m which was adequate to cover the width of the canal bottom. A walking speed of 4.5 km/h was maintained while applying the material.

The weed growth in the canal consists of several types of submersed vegetation (water milfoil, pondweeds), as well as cattails and reed canarygrass. Water was reintroduced to the canal in May of 1989 and the effects of the herbicide treatment were evaluated after weed growth began in earnest in June.

In early July, effects of the Sonar treatment began to show up on the cattails.

Typical symptoms of Sonar injury include a bleaching of the green pigment so that treated plants turn white. This characteristic was apparent on about 10% of the cattail and reed canarygrass in the treated sections of the canal.

Unfortunately, the low level of effect observed in July did not increase through the rest of the summer nor did effects become evident on the submersed weed growth underwater. It may be possible that inadequate herbicide remained in the soil over the winter and spring to cause significant control of the weed population.

Although the test was only partially successful, much was learned about the use of Sonar in irrigation canals. Information from this past year's efforts will be used to determine techniques that will improve the effectiveness of Sonar for aquatic weed control in irrigation canals. Even if Sonar does prove to be effective, it's a long road to obtaining government approval for the chemical's use here in Canada, says McGregor. It could be another 5 to 10 years before we have completed our research and obtained approvals, and only then could we commercially market Sonar, he adds.

For further information please contact Robert Burland, Alberta Environment, Provincial Building, 200 - 5 Avenue South, Lethbridge, Alberta T1J 4C7. Telephone (403) 382-4015.■

Sonar® — the registered trademark for Elanco Product's fluridone.

FREEZING TEMPERATURES MEAN BROKEN AIR VALVES

Protection is the Key

Along with the autumn colors comes freezing temperatures and the ensuing problem of broken air valves on irrigation pipeline turnouts. The St. Mary River Irrigation District (SMRID) decided something had to be done to prevent this costly yearly expenditure.

In the fall of 1988 the SMRID began experimenting with various methods to find a solution. Ron Renwick, P. Eng., District Engineer, felt that some type of insulation may be the answer. "We tried wrapping the valves with insulation but this didn't work very well. Next we tried insulated jackets similar to those used in the oil fields but again they weren't the answer", says Renwick.

The engineering staff designed, built and began experimenting with a steel canister insulated with 50 mm thick styrofoam, says Myles Kasun, irrigation technologist with the district. We chose two adjacent air valves protecting one with the insulated steel canister, the other valve was left exposed to the elements, says Kasun. Minimum temperature recordings were taken at both locations and were as follows:

	Minimum Temperature °C	
Date	Insulated Valve	Uninsulated Valve
88-10-25	6	2
88-10-26	5	1
88-10-27	- 3	- 7
88-10-28	- 4	- 9
88-10-29	- 7	-11
88-10-30	- 3	- 6
88-10-31	5	3
88-11-01	3	0
88-11-08	- 3	- 3
88-11-09	- 4	- 8
88-11-10	- 5	- 7
88-11-11	- 2	- 2
88-11-12	- 1	- 2
88-11-13	- 3	- 6
88-11-14	- 4	- 7
88-11-15	-11	-15

The insulated canister provided an average 3°C protection. It is believed the insulation also reduces the time the valve is exposed to the low temperature thus allowing less time for freezing to occur. The uninsulated valve was damaged at a low temperature of -7°C. The insulated valve was undamaged at -15°C, says Kasun.

Technologist, Paul Ewashen, demonstrates how easily an insulated canister can be removed for valve inspection.

The insulated steel canister does work as evidenced again, this past fall, where the SMRID had approximately 12 valves freeze that weren't provided the canister protection. Not one protected valve froze however. The canisters are left on year round providing protection from early spring frosts as well, adds Renwick.

One small design change, says Renwick, was the addition of a small hole in the bottom of the canister to equalize air pressure allowing for proper valve operation.

At a cost of approximately $300.00 apiece air valves are not cheap. The complete insulated steel canisters on the other hand cost approximately $120.00. Most welding shops can easily fabricate them and the insulation is available from Duncan Aluminum in Lethbridge, says Kasun.

For more information please contact Myles Kasun, Irrigation Technologist, St. Mary River Irrigation District, P. O. Box 278, Lethbridge, Alberta T1J 3Y7. Telephone (403) 328-4401.■

REMOTE SENSING

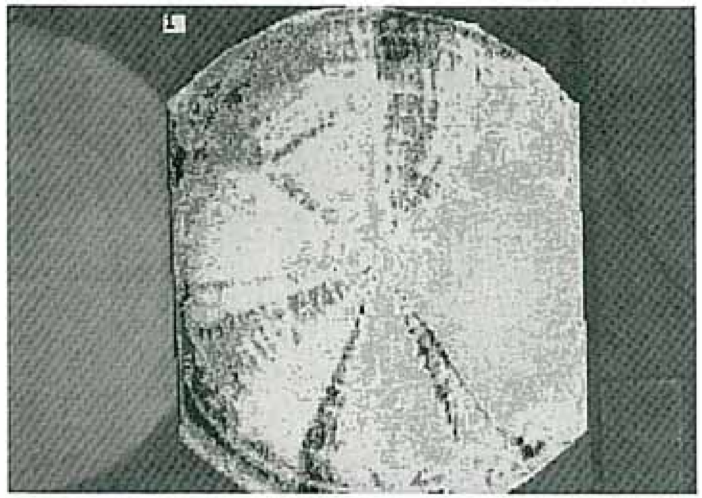
A Renewed Interest in Agriculture

Remote sensing, a technology that has been with us for the past 40 years, has recently seen major advancements which may aid today's irrigation farmers in making wiser on-farm management decisions. In the past, using a fixed winged aircraft for remote sensing purposes meant the images produced would only be utilizing the infrared band in the light spectrum. Verde Technologies Inc. of Watsonville, California has recently developed a new way of photographing the land surface using a fixed winged aircraft. This new technology developed by Verde utilizes computers to enhance images taken by a camera which uses three different wavelengths of the light spectrum. The wavelengths used are visible, near infrared, and thermal infrared. The photographs/images taken are stored on magnetic tape for computer enhancement and coloring.

Photographic images taken using the visible band will identify any problems related to stand density, leaf color, and general crop growth. Those images taken in the near infrared range will indicate plant growth and crop vigor. Images taken in the thermal infrared range can be used to determine crop canopy temperature.

In 1989, Western Industrial Service Engineering Inc. (W.I.S.E.) of Pocatello, Idaho (distributor of this service) approached Cascade Fertilizers and Alberta Agriculture, irrigation branch about this service, and asked whether or not this type of service might be of any interest to the irrigation farmers of southern Alberta. "In August of this year, approximately 3000 acres were flown (1500 acres in the Chin area and 1500 acres in the Bow Island area)", says Bob Riewe, irrigation management specialist with the irrigation branch. Some ground truthing was done to verify information provided by these images. The aerial photography identified a variety of different problems or conditions that existed but were not recognizable from ground level. Poor water distribution by the irrigation system, lodging, problems related to wind drifting, soil salinity, and soil variability (causing hot spots in a field) were quite noticeable from these photographs. There were also some fields in which there were no recognizable problems, he says.

The information package W.I.S.E. hopes to market, consists of three different crop maps.



The solid black areas on the Crop Vigor map represent areas where the crop has lodged. The lighter areas represent a slowdown in crop growth and plant tissue on a decline. The spoking feature on the map represents problems that may exist with the irrigation system.

1. Crop Growth Map: Corresponds to plant biomass and amount of foliage present.
2. Crop Vigor Map: Indicates areas in a field that would have different rates of growth or development. Good indicator of fertility, insect or disease problems. High vigor corresponding to higher yield.
3. Crop Temperature Map: Gives temperature variations across a field. High temperature could be related to soil variations, poor water distribution, insects, disease, or wind drift.

The information package which contains all three maps is known as a "Hawk 3", adds Riewe.

Information provided by this type of technology is not limited to irrigation or crop aspect of farming but can also be used for hail damage assessment, crop loss due to herbicides (drift, residue problems, or effectiveness), and acreage determination.

Besides this Hawk 3 package, says Riewe, W.I.S.E. has other packages dealing with Thermal Monitoring, Crop Damage, Frost Information, Irrigation Evaluation, and Soils.

For further information please contact Bob Riewe, Irrigation Management Specialist, Irrigation Branch, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta T1J 4C7. Telephone (403) 381-5868. ■

SELF-CLEANING TRASH SCREEN TESTED IN EID

Results Are Positive

One of the most persistent, complex problems that irrigation districts face is how to screen their irrigation water before it enters their closed pipeline systems. A unique new design recently developed in the United States has been modified and tested in the Eastern Irrigation District by the research group under the direction of Svat Jonas, P. Eng. of the irrigation branch.

Southern Alberta has relatively clean water, but nevertheless, a considerable amount of debris, vegetative matter, and trash is generated within the open irrigation distribution system itself. Two general classes or types of screens are used here in Alberta; the manually cleaned screen and the self-cleaning models. The self-cleaning screens are powered either by water or electricity. In some instances a ditchrider has to attend the non-automated screens every 3 or 4 hours to remove trash that has collected on the screen.

The new rotary screen built by Jonas was first modelled and tested in the Lethbridge Community College's hydraulic laboratory. It was tested under various flow and head conditions which were likely to be encountered in an actual irrigation channel.

The first prototype was built and installed this past irrigation season in the Eastern Irrigation District.

The disk and brushes rotate in opposite directions. This produces a higher brush velocity relative to the screen surface without having to run the brushes at high speeds. The relatively high angular velocity of the brush arms as compared to the screen disk results in every portion of the screen being brushed several times before it re-enters the water. The slightly tilted disk enables the screen to lift trash above the water surface before it is brushed aside. With the water pressure no longer holding the trash to the screen surface, it is easily removed. Trash removed from the screen is collected on the bank where it cannot re-enter the channel.

The electric driven rotating screen is actually a perforated disk, 0.9 m in diameter with three rotating brushes mounted on the top.

The traction drive system is very simple with low power consumption. To further reduce energy and minimize wear on the brushes a timer was installed, says Jonas. "It can be set by the ditchrider to any time interval and duration of rotation," he adds. The possibility of using water or solar power instead of AC current is under consideration.

As with any new development, says Jonas, there were some technical problems which had to be overcome. Otherwise the system worked fine. It's the "right idea" according to EID ditchrider, Jim Vinton, who operated the screens this past summer.

Districts who may wish to build or want additional information may contact Svat Jonas, P. Eng., Irrigation Branch, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta T1J 4C7. Telephone (403) 381-5870.■

WANT TO REPRINT AN ARTICLE FROM THIS BULLETIN?

We would like to encourage readers to reprint articles from this publication in their newsletters, newspapers, magazines, or other periodicals; but we request that you notify us before reprinting the information by calling (403) 381-5539, and add a line to the story that says: This article is being reprinted from Alberta Agriculture's Water Hauler's Bulletin.■

AN AUTOMATED EM-38 SYSTEM FOR SALINITY MAPPING AND RECLAMATION MONITORING

The land evaluation and reclamation branch has recently assembled the components of an automated EM-38 salinity mapping system. This system consists of an EM-38 salinity meter (Geonics Ltd. Mississauga, Ont.) mounted in a metal-free plexiglass cart that is towed behind a Suzuki all terrain vehicle (ATV). A Tandy 102 computer serves as a datalogger to record EM-38 readings. Soil salinity readings are obtained at predetermined intervals using a counter wheel mounted on the ATV and computer software developed by P.F.R.A. and Alberta Agriculture. Data is transferred from the Tandy 102 to an IBM microcomputer for conversion of raw EM-38 readings to saturation paste-equivalent electrical conductivity (ECe) values, using relationships developed for southern Alberta soils by Dr. R.C. (Colin) McKenzie, Alberta Agriculture, Brooks. Contour maps depicting variation in ECe values throughout a field may be generated using a program called "Surfer" and output using AutoCAD (Fig. 1).

This technology was developed for use in salinity mapping associated with land classification for irrigation development and for monitoring changes in the salt status of saline soils following canal rehabilitation. The system is also suitable for use in documenting the extent of salt-affected land associated with canals proposed for rehabilitation under the Irrigation Capital Works program.

Automated EM-38 salinity mapping system.

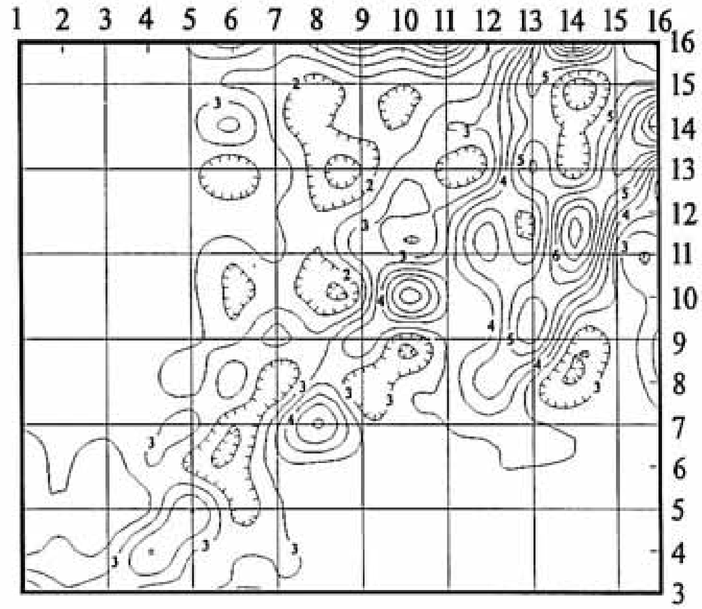


Fig. 1. Soil Salinity contour map generated using Surfer and AUTOCAD.

Advantages of the system include substantial savings in time and costs compared to conventional soil sampling and monitoring methods. Salinity mapping using this system is considerably more efficient and accurate since the larger number of readings allows better assessment of the variability and severity of salinity problems.

For further information, please contact Murray Peters, Land Evaluation and Reclamation Branch, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta T1J 4C7. Telephone (403) 381-5175.■

IRRIGATION IN ALBERTA

Facts & Impacts

The total developed area under private irrigation licences consists of approximately 95,000 hectares. Private irrigators wishing to develop new irrigation works may be assisted by the program known as Alberta Private Irrigation Development Assistance (APIDA) program.

This financial assistance is available to offset the capital costs of providing diversion and conveyance works to the edge of new privately irrigated fields. The Program is intended to complement funding to analogous works under the Irrigation Capital Works Program for irrigation districts.■

PIPELINE WEED SCREEN HOIST

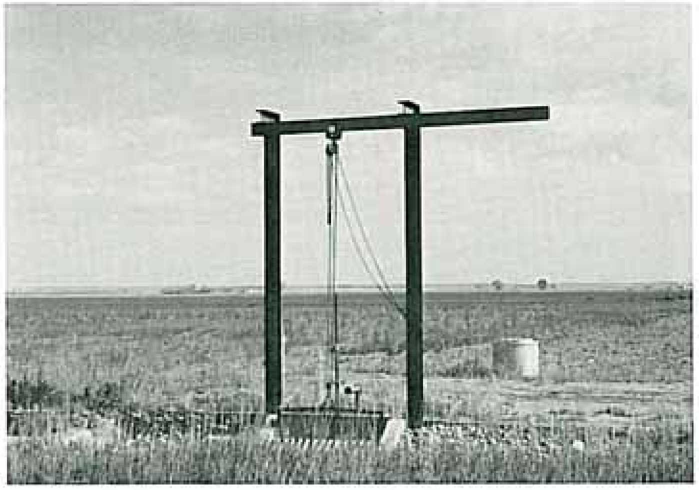
New Design Reduced Costs

Having trouble pulling screens from your pipe inlet structures? The Bow River Irrigation District's (BRID), Steve Topping, P. Eng., has come up with a unique hoist for removing screens from a pipe inlet structure for purposes of cleaning.

As every district is aware, keeping screens clear of debris is a continuous chore during the irrigation season. The BRID feels they may have an economical solution towards aiding their ditchriders in removing the screens from their inlet structures.

The district's pipe inlet structures are equipped with a trash rack plus two secondary screens to provide for better screening on their pipeline systems. It is these secondary screens that require frequent cleaning and are best cleaned while removed from the structure. Although BRID has used the gantry type of hoist for removing screens, they feel that this new type of hoist is not as costly and works well.

Assistant Water Master, Emil Johnson, demonstrates ease of removing and cleaning screens with new low-cost hoist.



Gantry type hoists such as this one on the BRID's C6E Pipeline are considerably more costly.

The hoist consists of a vertical 100 mm x 100 mm rectangular steel tube post approximately 3 m tall with a short cross beam at the top. A small 12 volt, 900 kg "warn" cable winch is mounted in a metal box onto the vertical post. The cable from the winch runs up through the tubing on a series of pulleys and extends out the end of the cross beam. The mechanism is constructed so that it swivels at the base and is bolted into the corner of the precast structure by an L-shaped steel plate backed up by another plate inside the structure.

The power source to operate the winch is supplied by the ditchrider's vehicle using a jumper cable. When used, the hoist pulls the first screen from a single point directly upwards until it is out of its guides. Then it is swivelled approximately 180 degrees so that the screen is clear of the structure and in a position where it may be easily cleaned with a broom. After cleaning, the first screen is replaced and the second screen is now removed and cleaned similarly. Using this procedure provides continual screening while the pipeline is in use.

BRID has installed several of these hoists on their structures and so far has found them to be working satisfactorily. According to Topping, the cost for one of these hoists installed on a 1050 mm pipe inlet structure is in the neighborhood of $1800. Costs could be more or less, depending on the size of the structure, he says.

For more information please contact Steve Topping, P. Eng., District Engineer, Bow River Irrigation District, Box 140, Vauxhall, Alberta T0K 2K0. Telephone (403) 654-2111. ■

IRMAA BULLETIN BOARD SYSTEM

It's Available For Use Now

The IRMAA BBS (Irrigation and Resource Management Division, Alberta Agriculture Bulletin Board System) (implemented using the RBBS-PC Version CPC17-1D Userware package) came online Monday October 16, 1989. The bulletin board is targeted for the general irrigation community with Alberta Agriculture staff, farmers, irrigation district staff, agribusiness, and consulting firms as potential users.

The IRMAA BBS information (bulletins) consists of four main areas:

1. Events Calendar
2. Water Supply Outlook and Climatic Information
3. Division Information Package
4. Other Miscellaneous Information

The user can display the information to the screen or the information can be downloaded to the user's system for browsing offline.

Requirements for the use of IRMAA are an IBM PC, XT, AT, PS/2 or compatible with one floppy disk drive, a 300/1200/2400 baud modem connected to a standard telephone line, and a PC communications software package (e.g. ProComm).

The current hours of operation for IRMAA are 15:00 to 08:00 (week days) and 24 hours/day (weekends and holidays). The access telephone number is (403) 381-5796.

If you have any questions, comments, or suggestions, or would like a copy of the IRMAA BBS User Guide, please contact Pat McIlhargey, Information Systems Analyst, Irrigation Branch, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta T1J 4C7. Telephone (403) 381-5855.■

IRRIGATION DRAINAGE AND FLOOD CONTROL IN CANADA

IRRIGATION DRAINAGE AND FLOOD CONTROL IN CANADA is a recent publication that traces the development and achievements of Canada in the fields of irrigation, drainage, and flood control. The publication has twelve chapters, each written to allow the reader a broader picture of the subject without having to cover the entire text.

The first five chapters endeavor to provide the reader with an understanding of the various factors that have influenced irrigation, drainage and flood control developments in Canada, including climatic, geographic, geologic, pedologic, demographic and other considerations. Chapters 6 to 12 provide details of developments in each of the provinces. Having a copy of this document in an office library will certainly be a useful and informative reference, particularly for those operating or having a direct interest in the field.

For more information on how to obtain one of these documents please contact Larry Spiess, P. Eng., Section Head, Irrigation Branch, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta T1J 4C7. Telephone (403) 381-5152.■

THE WATER HAULER'S BULLETIN

Designed to provide the operation and management personnel of Irrigation Districts with items of interest in their line of work. Comments are welcome. Please contact Duncan Lloyd, editor, at Area Code (403) 381-5539, Lethbridge.

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Alberta AGRICULTURE