

PARTICIPATORY IRRIGATION RESEARCH AND DEMONSTRATION IN CANADA

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ABSTRACT

The importance of producer and public participation in research, demonstration and extension is becoming better recognized on a world-wide basis.

Currently in Agriculture & Agri-Food Canada, much emphasis is being placed on identification, recognition and satisfaction of client needs. Partnerships and co-operative ventures with the private sector and other government agencies are being encouraged and pursued. The Prairie Farm Rehabilitation Administration (PFRA), as part of Agriculture & Agri-Food Canada, has been a leader in encouraging these partnerships, particularly as they relate to irrigation research and demonstration and their effect on rural development and environmental sustainability. Today, in co-operation with private industry and the provincial government, PFRA successfully operates research and demonstration centres at Outlook, Saskatchewan (Canada-Saskatchewan Irrigation Diversification Centre) and Carberry, Manitoba (Manitoba Crop Diversification Centre).

The partnership at the Canada-Saskatchewan Irrigation Diversification Centre was finalized in July, 1998. In view of the newly formed partnership, a results-based strategic planning session was held to determine the future direction of the Centre. Participants in the workshop included a broad range of producers, industry, university and government stakeholders. The workshop was designed to achieve a consensus on a vision for the role of the Centre, the obstacles which may prevent achieving the vision and the strategic direction the Centre must take. This participatory workshop was successful in providing this information.

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INTRODUCTION

The importance of producer and public participation in research, demonstration and extension is becoming increasingly well recognized on a world wide basis. Irrigation systems are complex "socio-technical" systems which involve interaction between the physical environment, the application of technology, the practice of agriculture and the often competing interests of multiple stakeholders. Consequently, sound technical analysis, astute management and the active participation of stakeholders is critical to realizing a positive return to societies investments in irrigated agriculture (Vermillion & Brewer, 1996).

The challenge for researchers today is to develop economically viable technology that is easily adaptable to the rural society (Tollefson & Wahab, 1996). Much of the developed world has traditionally followed the paradigm, whereby research is conducted at universities and the resultant technology is transferred through various extension mechanisms to the producer (Tollefson, 1992). Hill & Tollefson (1996) suggest that increased farmer participation is critical because it provides greater accountability resulting in increased productivity.

The Prairie Farm Rehabilitation Administration (PFRA), as part of Agriculture & Agri-Food Canada, has been a leader in encouraging partnerships and private sector involvement in irrigated research, demonstration and extension. The emphasis is on rural development and environmental sustainability. Today, in co-operation with private industry, and provincial governments, PFRA successfully operates irrigated research and demonstration centres at Outlook, Saskatchewan, and at Carberry, Manitoba.

The following paper outlines the role, operation, achievement and future direction of these facilities.

CANADA-SASKATCHEWAN IRRIGATION DIVERSIFICATION CENTRE

Background

The Canada-Saskatchewan Irrigation Diversification Centre (CSIDC) originated as the Prairie Farm Rehabilitation Administration (PFRA) Farm at Outlook, Saskatchewan. The PFRA Pre-development Farm was established in 1949, prior to the construction of the Gardiner Dam. The farm was designed to demonstrate irrigation technology to assist farmers in their transition to irrigated agriculture. Upon completion of the Gardiner Dam and the formation of Lake Diefenbaker, the farm became known as the Demonstration Farm and served a useful role in

demonstrating irrigation technology.

It was recognized, however, that additional research and demonstration support was necessary if the project was to be successful. Individual programs by Agriculture & Agri-Food Canada, PFRA, the University of Saskatchewan and Saskatchewan Agriculture & Food, although limited, were underway. They addressed specific organizational or scientific objectives often on an independent basis. A need existed for a co-ordinated, co-operative program.

The Saskatchewan Irrigation Development Centre (SIDC) was established in 1986, as a jointly funded federal/provincial agency as a result of a Memorandum of Understanding (MOU) between Agriculture & Agri-Food Canada, PFRA and Saskatchewan Agriculture. The MOU made SIDC responsible for planning and co-ordinating all federal and provincial irrigation research and demonstration activities in the province of Saskatchewan.

To facilitate this role required a major upgrading of physical facilities. This included replacement of the water supply canals by a buried pressurized water supply line, the purchase of three electrical centre pivots and a specially designed research linear system. In addition, surface drainage was improved and subsurface drainage installed where necessary. A full line of small plot research equipment was purchased along with the construction of a modern office/laboratory complex. Scientific and support staff were hired to conduct programs responsive to client needs. These changes helped make SIDC a world quality irrigation R & D facility.

In recognition of the importance of partnerships and, particularly, the role of industry in the partnership, a new MOU was signed in 1998. This MOU now included Canada (Agriculture & Agri-Food Canada, PFRA), Saskatchewan (Sask Water) and Industry{(Saskatchewan Irrigation Projects Association (SIPA) and the Irrigation Crop Diversification Corporation (ICDC)) at the management table of the newly named "Canada-Saskatchewan Irrigation Diversification Centre" (CSIDC). This agreement places CSIDC in a strong position to meet the future needs of its clients.

CSIDC Mandate

The mandate of CSIDC is to help maintain a viable agriculture industry, to support a sound rural economy, and to preserve a healthy environment. To achieve this mandate, CSIDC strives to:

1. Identify higher value cropping opportunities through market research to

help target the research and demonstration effort.

2. Conduct, fund and facilitate irrigated research and demonstration to meet the needs of irrigation producers and the industry.
3. Develop, refine, and test methods of diversifying and intensifying irrigated crop production in co-operation with outside research agencies.
4. Develop and demonstrate sustainable irrigated crop production methodology.
5. Promote and extend sustainable irrigated crop production methodology.
6. Evaluate the environmental sustainability of irrigation through investigation of its impact on natural resources.
7. Promote a Western Canadian approach to irrigation research and demonstration by co-operating with staff from similar institutions and from industry. Increased levels of co-operation in marketing, research and demonstration support diversification and value added processing. Transfer of such technology strengthens the industry.

The CSIDC operates programs in specialty and field crop agronomy, environmental sustainability, market analysis, technology transfer and on-farm field demonstrations to help meet the needs of its clients.

Organization

The Executive Management Committee (EMC) is the main governing body of the Centre. The EMC has equal representation from Canada, Saskatchewan and Industry. Each of Canada, Saskatchewan and Industry (ICDC) designates one of its appointees as joint chair. The chair of the EMC rotates annually among the three joint chairs. The EMC shall meet at least twice per year.

Decisions of this group are reached by consensus. The EMC is responsible for the overall workplan and broad policy direction of CSIDC.

Each of the partners agree to work co-operatively and provide financial and in-kind support to the Centre. Canada agrees to provide management, staff and facilities support.

Achievements

Research and demonstration activity conducted, funded and facilitated by CSIDC have resulted in many achievements. The following are some of the more noteworthy:

Crop Diversification:

1. In 1986, there was virtually no dry bean production in the irrigated areas of Saskatchewan. More than a decade later, in 1999, there were 8,000 acres of dry bean. Research and demonstration conducted by CSIDC has played a significant role in this expansion.
2. Canola is a major crop in the irrigated areas of Saskatchewan (20,000 acres). This expansion is due in part to the identification by CSIDC of a high yielding, lodging tolerant variety (Global) well adapted to irrigated conditions. Newer varieties have since been identified by CSIDC which have a 10 - 15% yield advantage over Global.
3. CSIDC played a pivotal role in the identification of Northern Vigor⁵ of seed potatoes. Saskatchewan grown seed produces on average a 20% yield increase compared to locally grown seed when planted in the United States or Mexico. A major acreage of seed potatoes is now being produced under irrigated conditions in Saskatchewan. This acreage doubled between 1993 and 1996 and is expected to expand in the future.
4. CSIDC assisted industry in evaluating spearmint and peppermint production under irrigated conditions. Positive results have lead to the construction of a distillation plant in the Outlook area to process the oil.

Intensification:

1. A full complement of crop variety testing is now being conducted for many crops grown under irrigated conditions. An updated irrigated crop variety guide is published annually and is distributed to irrigators.
2. Soil test benchmarks and fertilizer recommendations have been re-evaluated for irrigated conditions.

⁵Northern VigorTM is a registered trademark of the Saskatchewan Seed Potato Growers Association.

3. Production knowledge such as seeding dates and rates, row spacing, and depth of planting, have been evaluated and refined for many of the commonly grown irrigated field crops and for a wide variety of specialty and horticultural crops.
4. Trials at SIDC have shown that it is possible to reduce energy costs of center pivot irrigation by up to 50% and to improve application efficiency using lower elevation spray application (LESA).

Environment:

1. An evaluation of the effect on groundwater quality of agrochemicals applied to irrigated cropland is being conducted. A large scale subsurface drainage system has been installed which allows replicated field scale investigations to be conducted on the effect of irrigated crop management practices on groundwater quality.
2. The effect of irrigation on soil chemical and physical properties and long-term productivity have been studied.
3. A unique field scale plot has been used to demonstrate the reclamation of a salt affected area using subsurface drainage and leaching.
4. SIDC expertise has been recognized and utilized in the international sphere. This includes technical and administrative support of the CIDA sponsored Canada/Egypt National Water Quality and Availability Management program (NAWQAM) and the water savings component of the Hebei dryland project in China. SIDC staff are also involved in international technical committees.

Public Awareness

In 1998, more than 2,000 visitors viewed the Centre. Twenty-four guided tours were conducted, several of which were for foreign delegations. Highlights include the annual field day, the evening tour along with a number of commodity based tours. In 1998, more than 500 people witnessed the signing of the CSIDC Memorandum of Understanding by federal and provincial ministers, and industry representatives.

Public presentations are routinely made at scientific and extension events.

Future

CSIDC recently completed a strategic planning process which involved stakeholders, ie: producer, industry, university and government. The following recommendations were developed at that workshop and will be utilized to help shape the future direction of CSIDC. They included:

1. Develop a CSIDC Business Plan.
2. Secure appropriate irrigation R & D funding through A-level funding (federal and provincial), federal/provincial/ industry agreements, and research/ industry contracts.
3. Commission the documentation of irrigation personnel, and R and D information applicable to Saskatchewan conditions in an electronic database.
4. Encourage collaborative R & D partnerships on a prairie-wide and on an international basis.
5. Commission the creation and distribution of an updatable irrigation manual for the Canadian Prairies.
6. Define requirements for and identify mentor irrigators to be involved in a farmer-to-farmer information exchange.
7. Establish four irrigation demonstrations spoke sites located province-wide.

These recommendations are currently being implemented by the CSIDC Executive Management Committee.

MANITOBA CROP DIVERSIFICATION CENTRE (MCDC)

Background

The Manitoba Crop Diversification Centre was established in 1993 under a ten-year agreement among the Government of Canada (PFRA), the Government of Manitoba and Industry (Manitoba Horticultural Productivity Enhancement Centre Inc. (MHPEC)). In many respects, it was modelled after the CSIDC. The goal of MCDC is to develop and operate a Centre through which crop diversification and production enhancing technologies can be investigated and demonstrated for the benefit of the agriculture industry in Manitoba.

All three partners in MCDC are actively involved through participation in the Centre Management Program Advisory Committees. Input from other industry and stakeholder representatives is also obtained at annual program advisory meetings.

Infrastructure

The MCDC headquarters site is located at Carberry, Manitoba. It operates satellite sites at Portage la Prairie and Winkler, Manitoba.

The Carberry site is located on one-half section of excellent agricultural land. Buildings include an office-lab-classroom complex, a sample processing area, shop, machinery, chemical and grain storage. Equipment for most operations is owned, while some field and research operations are contracted or conducted by project co-operators. A modern irrigation system has been installed, which permits irrigation of approximately 70 ha of the land, using three centre pivots and two linear-move systems. These are well-adapted to meet the requirements of irrigation research trials. This capability is unique to MCDC in Manitoba. Most irrigation research in Manitoba requiring good control is now conducted at MCDC.

The Portage la Prairie site was previously an Agriculture and Agri-Food Canada Research Centre sub-station. Two linear-move field irrigation systems and an irrigation water supply delivery system were installed to facilitate irrigation at this site.

The Winkler site consists of approximately 16 ha of sandy loam, mostly irrigated by a linear-move field system. There are no buildings or full-time staff on-site. Most field and plot operations are carried out by staff operating from the Portage la Prairie site.

The three MCDC sites are strategically located in areas of Manitoba with high-value irrigated crop production potential and a range of representative soils. MCDC is also affiliated with the Parkland Crop Diversification Foundation (headquartered at Roblin) and with the Souris Valley Irrigation Centre at Melita.

MCDC Mandate

The primary goal of MCDC is the investigation and demonstration of sustainable crop production through crop diversification and intensification production practices.

The Centre accomplishes this by:

1. Identification of the needs of horticultural and other producers, and of industry,
2. Support of the development of value-added processing in Manitoba,

3. Investigation and demonstration of crop diversification and environmentally sound management practices under irrigation at strategic locations in the province,
4. Contributing to public awareness of the role of agriculture,
5. Facilitation of applied research and demonstration activity,
6. Development of production technologies.

Much of the Centre's current activity is conducted in co-operation with outside agencies, groups and individuals. The Centre provides technical and facilities support, along with an irrigated land base to assist irrigated research and demonstration activities. Potato and special crop production agronomy, and groundwater quality constitute the research program. The field demonstration program focuses on field, forage, herb and spice, fruit and nutraceutical crops.

Extension

Results of the MCDC program, and information on agriculture diversification, potato production, irrigation, and environmentally responsible agriculture, are extended to the industry and the public by several means. The Centre's Annual Report and Newsletter (*The Rainbow*) are widely distributed. Staff participate in trade shows and seminars, organize extension meetings, host annual tours at each site, and respond to office and telephone inquiries. Since most projects are co-operative, the co-operating agencies also transfer information through established contacts and mechanisms.

Results, The Future

The value of diversification to the agricultural and rural economy is well accepted. Higher value crops, although often more difficult to produce and market, have potential farmgate returns far in excess of more traditional crops. This is a major emphasis for MCDC. The Centre also plays a key role in monitoring and promoting the environmental sustainability of intensive field agriculture.

MCDC is in its sixth field season, and has recently had an independent program evaluation to assess its progress in meeting the program objectives. Recommendations were made for consideration by Centre Management, to allow it to better define and focus the Centre's role and activities now that it is well-established as an agency. The general support indicated by partners and stakeholders for the future operation of MCDC indicate the success to date and future potential of the Centre in playing a meaningful role in the development of agriculture in Manitoba.

ALBERTA

The province of Alberta has the largest irrigated acreage in Canada. Currently, discussion and studies (Agri-Team Consultants) are underway regarding environmentally sustainable irrigation crop diversification initiatives in Alberta. The approach would again be a partnership with two levels of government and industry being represented at the management table. A need exists for applied research and demonstration to fill the gap between plot scale research and field production. This industry-driven participatory approach similar to that of Saskatchewan and Manitoba would fill this need.

CONCLUSION

Research in the past has been developed by researchers and transferred through various extension mechanisms to the producer. This has often resulted in a top down unidirectional information flow with little input from the producers. Participatory research integrating the ideas of researchers, extension personnel and producers has shown great promise. CSIDC and MCDC are two examples of models used in Canada to encourage a participatory approach. Good success has been evidenced to date.

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