

Developing a research and extension philosophy for an agricultural region

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Introduction

The Dryland Research Institute is the Western Australian Department of Agriculture's Eastern Wheatbelt centre for research and extension. It was set up in the early 1980's, replacing the Merredin office which was primarily an extension unit.

The Institute services approximately 3 million hectares in the 275 to 340 mm rainfall belt. The rainfall is winter based with the season opening in May, pastures drying off at the end of September and cereal harvest commencing in mid November. There are 1210 farms in the region averaging 2300 arable hectares in size. Properties are rotationally farmed with wheat and sheep for wool the major enterprises. Approximately half the farm is in crop in any one year.

Systems approach

The Dryland Research Institute has been developed and operated on an agricultural systems approach. The overall objective of the Institute is:

"To develop, research and extend agricultural systems for the Eastern Wheatbelt which will be viable in the long term". The key to achieving this objective has been to concentrate on the development of mainstream agriculture, to involve farmers in setting research and extension directions and maintaining an effective interdisciplinary team of staff.

Research - extension - farmer interaction

In setting objectives, the research - extension - farmer interaction is most important and promotion of this linkage is part of the philosophy of the Institute. For a systems approach to be successful it is essential to involve extension staff and farmers in the definition of research needs. After all, they are the end users of the results of research.

Extension officers in the Western Australian Department are generalist advisers responsible for conservation, crop, pasture and animal production advice. This encourages a whole farm approach to extension.

There are 4 advisers for 1210 farmers in the Merredin region. To be effective, emphasis is placed on mass media and group extension. As well as field days and seminars, extension is carried out through friendship groups. These groups consist of 6-12 farmers, with common interests, who freely discuss farming technology. Up to 23 of these groups operate in the region. As well as being an effective medium for extension, they are useful in defining the future directions and limitations to the farming system.

The Institute also has an advisory committee made up of eleven of the leading farmers from throughout the region. These farmers meet with Institute staff 3 to 4 times a year to discuss research and extension directions. The farmers were selected on their technical abilities as well as their involvement in the farming community. This committee is active in setting research priorities and through their membership of farmer organisations members have assisted in attracting research funds to the Institute.

Specific objectives

In the early 1980's researchers, advisers and leading farmers were concerned about the sustainability of the then current year in year out wheat/pasture rotation practiced across the landscape.

Identified problems were -

- There is a range of very different soil types with very different crop and pasture production potential.
- Most soils are nitrogen responsive yet there were few legumes in the system.
- There was a reliance on multiple cultivations to establish the crop. Not only did this lead to soil degradation and erosional problems but also delayed the time of sowing of the crop.
- Gross margin analysis was being used to encourage farmers into more intensive cropping rotations. This was used out of context as the overall costs and returns and the complementarity of enterprises were not being considered.

After much discussion and interaction of researchers, advisers and farmers, the group at the Institute set the more specific objectives:

- To develop for each of the major soil types in the region cereal, grain legume and pasture legume options.
- To develop farming techniques which are environmentally sound and agriculturally practical.
- To integrate the technical, environmental and economic information into a profitable whole-farm system.

Implementation of objectives

As the relative profitability of crop and livestock enterprise varies, it is important to develop a range of options for each of the main soil types.

Four, then **six** soil classes were defined for the Eastern Wheatbelt.

SOIL CLASS	% OF LAND-SCAPE	DESCRIPTION	pH AT SURFACE (WATER)	% CLAY
Heavy	25%	Sandy Clay Loam	6.5	25-35
Medium	15%	Red Clay Loam	6.0-7.0	20-25
Duplex	10%	Sandy Loams, Loamy Sands, Gravelly Sands and Sand over Clay	5.5-6.5	10-15
Gravelly Sands	10%	Gravelly Sands	5.5-6.0	10-15
Sandplain Soils	20%	Deep Loamy Sands	5.5-6.0	10-15
Acid Sands	20%	Loamy Sands and Gravelly Sands	5.5	10-15

In the early 1980's there were 2 researchers at the Institute - M. Ewing, Research Leader and Pasture Agronomist, and Dr W. Porter, Plant Nutritionist Acid Soils. Wheat was the major cereal, Barrel medic was suitable for the heavy soils and subclover was not persisting on light soils in a 1:1 crop pasture rotation.

The options were discussed and research programmes formulated.

SOIL CLASS	OPTIONS		
	CEREALS	GRAIN LEGUME	PASTURE LEGUME
Heavy	Wheat BARLEY*	FIELD PEAS*	Barrel Medic
Medium	Wheat	FIELD PEAS*	BURR MEDIC*
Duplex	Wheat	LUPINS/PEAS*	BURR MEDIC*
Gravelly Sands	Wheat	LUPINS/PEAS*	subclover
Sandplain Soils	Wheat	LUPINS*	subclover
Acid Sands	Wheat OATS* TRITICALE*	LUPINS*	SERRADELLA*

*Options defined as needing further research.

The research staff at the Institute have increased from 2 in 1982 to 10 in 1989. Total staff numbers have increased from 15 to 42. There has been a significant input into cereal agronomy and grain legume pathology research from South Perth based researchers.

Almost all research projects conducted from the Institute have Rural Industry Research Funding support and a significant number of the technical and professional staff are on industry funded contracts. Funding through industry provides a mechanism for setting defined objectives with regular assessment and review. It is a useful form of programme planning and budgeting.

Interdisciplinary teamwork

The maintenance of an interdisciplinary team, including extension staff, is critical and has been promoted through in-house seminars and many informal discussions.

Most of the research at Merredin on the relative performance of cereals and grain legumes on the various soil classes was carried out by the pasture agronomist and plant nutritionist.

The inclusion of advisers in the team has kept the research "systems" orientated. Also advisers then have immediate access to the latest technical information providing a solid base for "leading edge" extension programmes.

Farmers in the Eastern Wheatbelt have adopted the new technology particularly early sowing of cereals, grain legumes and the establishment of burr medics. Farming by soil type is now an accepted practice in the Eastern Wheatbelt.

An indication of this adoption is illustrated by the area sown to different crop types over time.

CROP AREAS (hectares) - 11 Shires in Merredin region.

	1980	1984	1987(e)
Wheat	1,225,500	1,377,200	1,034,000
Barley	42,900	69,900	49,200
Oats	55,900	51,900	81,400
Triticale (e)	0	10,000	3,500
Lupins	500	58,800	140,200
Field peas (e)	0	0	18,000

(e) Estimate

Sustainability

The sustainability of Eastern Wheatbelt agriculture is of major concern. The challenge for research and extension is to develop conservation farming practices which are profitable in the short and medium as well as long term.

Research and extension has been directed towards the use of gypsum and direct drilling on the heavy soil types and minimum cultivation on other soil classes. The agricultural engineers based at Merredin are also part of the team and are researching seeding, spraying and harvesting equipment for minimum tillage farming systems. A hydrogeologist was based in the region for 3 years to assess the risk from salinity. The lupin/wheat rotation, which has been widely adopted, is also a high water use rotation reducing ground water recharge.

Development of the MIDAS model

A major influence on the operations of the Dryland Research Institute has been the development of the MIDAS model (Model of an Integrated Dryland Agricultural System). This model is discussed in detail in other papers at this conference

(Morrison Kingwell and Warren). The first version of the MIDAS model was developed by South Perth based economists in consultation with Merredin staff and other researchers. The process of accumulating the technical information for the model provided teamwork development and encouraged staff to consider their research programmes in a farming systems context.

MIDAS has important uses in deciding research direction by assessing the effect of likely outcomes on whole farm profitability. It has assisted in setting pasture research priorities in the region. (Ewing and Pannell). Its major use currently is in developing extension programmes.

Conclusion

The Dryland Research Institute Merredin is an applied research extension unit of the Department of Agriculture. The philosophy has been to set objectives which relate to mainstream sustainable farming systems. Then to use an interdisciplinary team and farmer interaction to research, develop and extend the technology.

References

1. Morrison D.A., Kingwell R.J., Warren J. - MIDAS an economic modelling approach to determine research directions for whole farm systems. 1989 Australian Society of Agronomy Conference Paper.
2. Ewing M.A. and Pannell D. Developing regional pasture research priorities. W.A. Department of Agriculture Technote No. 6/86.