IMPLEMENTING AN EXTENSION STRATEGY

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Abstract

In 1980, it was proposed that extension programmes include projects designed specifically to increase productivity in particular extension areas. By identifying factors which limit the production in a cane growing community or a section of the community, extension programmes can be formulated in order to overcome these limitations. Such projects have since had considerable impact, not only in the extension areas in which they originated but, in many cases, throughout the industry. Extension programmes aimed at improving productivity offer a valuable opportunity for extension performance to be evaluated. In this paper various examples of such projects are presented and extension strategies in general are reviewed.

Introduction

Extension services throughout the agricultural world are now being assessed in terms of their cost-effectiveness in order to justify their existence. In a number of places, government funding for extension has been substantially reduced and a charge for extension services has been introduced. This has occurred in Australia, and one of the reasons given for this is that no adequate study on the contribution of extension services to farming productivity exists and, therefore, no information on the cost-effectiveness of government expenditure on agricultural extension is available.

Traditionally, it has not been considered necessary to evaluate the contribution of the extension service to the farming enterprise. Its role has been primarily one of providing a social service. This is no longer regarded as sufficient in today's 'result-orientated' world. Extension, like any other service, must advertise its achievements and establish its worth.

To evaluate extension work and its cost-effectiveness is often a demanding task. The more complex the enterprise, for example a developing or mixed farming regime, the more difficult it is to evaluate the extension contribution to it. However, such complications seldom occur in the sugar industry and so formulating programmes and evaluating them is less difficult.

It is the authors' belief that carefully prepared projects aimed directly at improving productivity in an area, and forming part of the annual programme of work, would greatly facilitate the evaluation of extension effort in the sugar industry, improve the Experiment Station's credibility, and provide the Extension Officer with very necessary job satisfaction.

Project Planning

Five steps should be considered when planning a project:

- problem identification
- objective determination
- plan of work
- programme of work
- evaluation of progress

These aspects were dealt with in some detail in a previous paper (Paxton[4]). A project should normally account for no more than 20% of an Extension Officer's working time, but the proportion would depend on the value of the project to the overall extension strategy.

Projects under Review

Only a few completed and existing projects can be reviewed but these will give an indication of the range of subjects which result from the problem identification phase in project planning. 'Situation surveys' have been carried out as projects in some areas in an attempt to identify the limiting factors applying in the area.

Smut control project: an early project carried out in 1979–80 on the Umfolozi floodplain, before Local Pest and Disease Control (LP & DC) Committees and Regulations existed, provides an example of how project planning and implementation can be carried out.

A survey carried out by the Pathology department (there were no field survey teams then) showed high levels of smut on the Umfolozi Flats, particularly in the more susceptible varieties such as NCo310 and N55/805 (Table 1). A project was planned to reduce the level of smut (to acceptable levels) in this part of the extension area. The plan was to hold meetings with grower groups in the area, and to make them aware of roguing methods, the benefits of true-to-type, disease-free seedcane, and smut-resistant varieties. These meetings and demonstrations were programmed over a period of some 14 months and the evaluation of the programme took the form of a subsequent survey by the Pathology department which showed a satisfactory decrease in smut levels (Table 2).

This project gave the Extension Officer and the growers in his area considerable satisfaction in achieving a significant reduction in smut levels over a relatively short period, and was instrumental in creating the first real awareness of the problem of smut in cane on the Umfolozi Flats. As smut

Table 1

Results of smut survey in Monzi area, 1979

Details	NCo376	NCo310	N55/805
No of fields inspected	7	63	5
Area inspected (ha)	46,5	429,6	31,0
No of fields with smut	7	63	4
Mean % stools with smut	5,0	8,9	10,6

Table 2

Results of smut survey in Monzi area, 1980

Details	NCo376	NCo310	N55/805
No of fields inspected	18	33	34
Area inspected (ha)	130,0	267,0	216,0
No of fields with smut	13	32	33
Mean % stools with smut	0,4	2,3	2,6

disease continues to occur on the Umfolozi Flats, the project continues through the LP & DC Committee. Growers had mean levels of less than 1% smutted stools on their farms in 1986–87, despite the fact that NCo310 and NCo376 (which is also susceptible to smut) are still major varieties grown in the area.

Operation low top: the introduction of cane production restrictions in 1978 and 1979, increased transport costs, and the continually low sucrose contents of cane produced in the midlands, led to an examination of ways and means of improving cane quality and reducing the transport costs of growers delivering to the Union Co-operative and Noodsberg mills.

The Union Co-operative mill had, prior to 1979, consistently recorded the lowest sucrose % cane in the sugar industry and the situation at the Noodsberg mill was not very different. Poor cane topping standards were identified as one of the main contributors to the poor cane quality. Members of the Union Co-operative have an understandable interest in the amount of sucrose recovered from their cane at the mill.

The project was launched in March 1979 (Mann[3]), in close co-operation with milling staff, and using accepted extension practices. Growers were made aware of the need to improve topping height. Cane cutting and topping courses were held in the area and the height of topping was monitored for a selected group of cane cutters.

The results of the 1979–80 milling season at these two mills are compared with those of the previous seasons in Figure 1. The average sucrose % cane delivered to the Union Co-operative mill was 13,03% or 1,25% units above the 5-year average. At the Noodsberg mill the final annual sucrose % cane was 12,99% or 0,81% above the 5-year average. This campaign may not have been the only reason for the improved sucrose % cane for the season, but there is reason to believe that the project had a significant effect on the improvement in cane quality.

Since the 1979–80 season it has only been in seasons of unfavourable weather in the Natal Midlands that the average pol % cane at the two Midland mills has dropped below the industrial average (Figure 2), and the sucrose levels at these mills have often been amongst the highest in the industry. This has resulted from 'clean cane' programmes and improved cane quality programmes introduced by the mills themselves, coupled with the improved height and accuracy of topping and the awareness of cane quality engendered by this project. In more recent seasons the introduction of a new variety has also contributed to improved sucrose content of the crop.

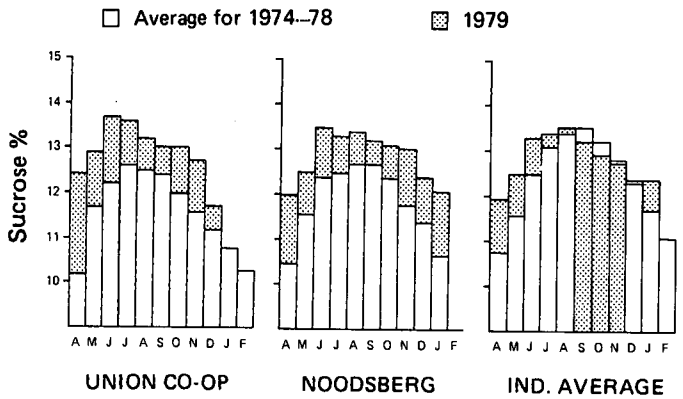


FIGURE 1 Average sucrose % cane for 1974–78 and figures for 1979.

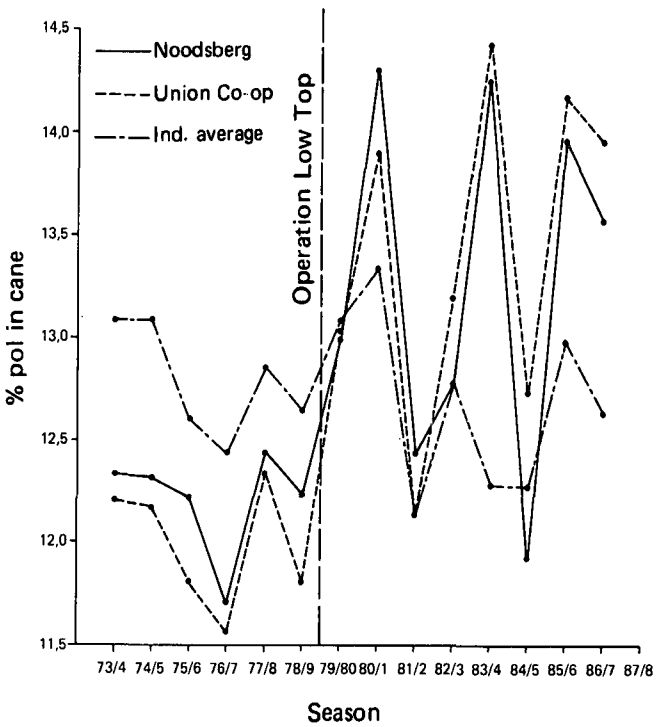


FIGURE 2 Pol % cane Midlands mills vs industrial average 1973/74 to 1986/87.

The success of the quality control schemes in the midlands has stimulated interest in other parts of the sugar industry, particularly at Umfolozi where the Umfolozi Co-operative members could benefit significantly from an improvement in the quality of cane they deliver to the mill.

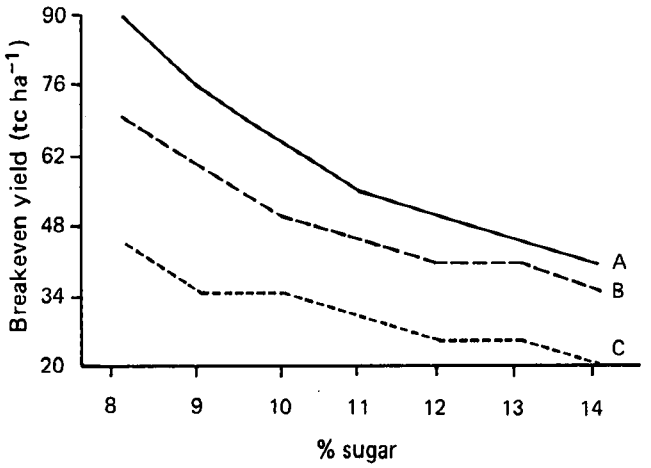
Cane quality campaign: Umfolozi Co-operative sugar planters

The Umfolozi cane quality campaign was planned and tested in 1985–86 and implemented in 1986–87. The primary objective was to optimise each grower's profit per hectare. A Cane Quality Committee made up of members of the Co-operative, the Co-operative's management team, and the Extension Officer managed the project. The team had 3 major tasks:

- to familiarise members with the cane payment system in use at the mill with particular emphasis on the negative effect of poor quality cane. (Co-op growers are paid for each ton of estimated recoverable sugar and not for each ton of sucrose)
- to provide weekly reports to each grower on the revenue received per consignment of cane delivered
- to provide an advisory and information service.

The responses to the scheme have exceeded all expectations. Growers are now aware of the effects that tops and trash have on juice purity and of the relationship between topping height, cane quality, and transport costs. Perhaps the most important benefit of the campaign to the grower is the information provided weekly which has resulted in improved harvesting scheduling and management, while the benefits to the mill are improved cane quality and a significant decrease in ash % cane.

Relating cane quality to transport and other variable costs, a large estate in the area now provides managers with a range of break-even sugarcane yields per hectare corresponding to a range of sugar % cane values. These figures are used as a guide to achieve optimum topping height, and for ploughout decision making (Figure 3).



A = 100 km from mill by rail. Irrigated.
B = 50 km from mill by rail. Irrigated.
C = 26 km from mill by road. Rainfed.

FIGURE 3 Breakeven cane yields/ha x sugar – 3 areas.

The cane to sugar ratio is one measure of cane quality. Cane quality at Umfolozi is compared with the industrial average in Figure 4. Ash % cane is compared in Figure 5.

In real terms comparing 1985/86 season with 1986/87 season, Umfolozi Co-Operative produced *6 146 tons more sugar* from *21 470 tons less cane* milled, valued at *R2 128 360* 'A' pool price (R343 60/ton) or *R1 155 694* 'B' pool price (R188 04/ton).

The computer analysis of farm records: the belief that present yields in the sugar industry could be improved and brought closer to potential yields by the application of sound management principles, and that proper planning and control in management cannot be achieved without reliable data and records led to the initiation of a project on the north coast (Hulbert[2]) to collect and analyse farm field records by computer.

The project ran for two years and was completed in the 1980–81 season, and eventually in 1986 resulted in the records of some 80 estates being analysed. Following the initiative that this project provided, about 200 estates throughout the industry became involved in the analysis of field records.

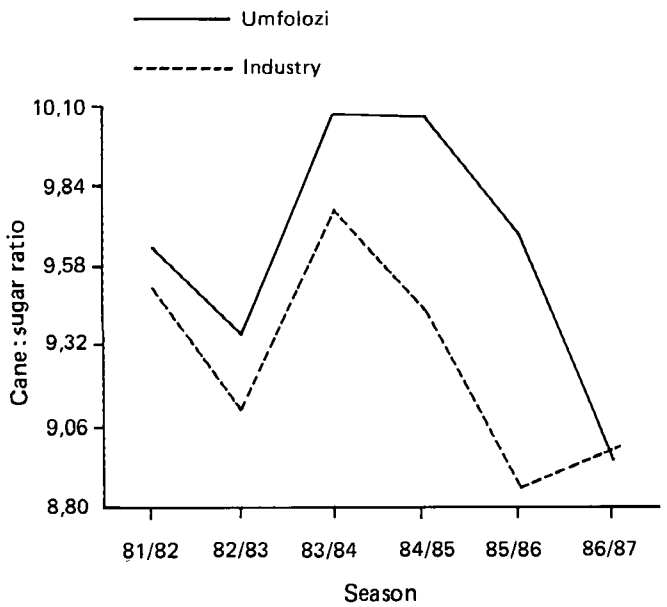


FIGURE 4 Cane: sugar ratio – Umfolozi vs industry average.

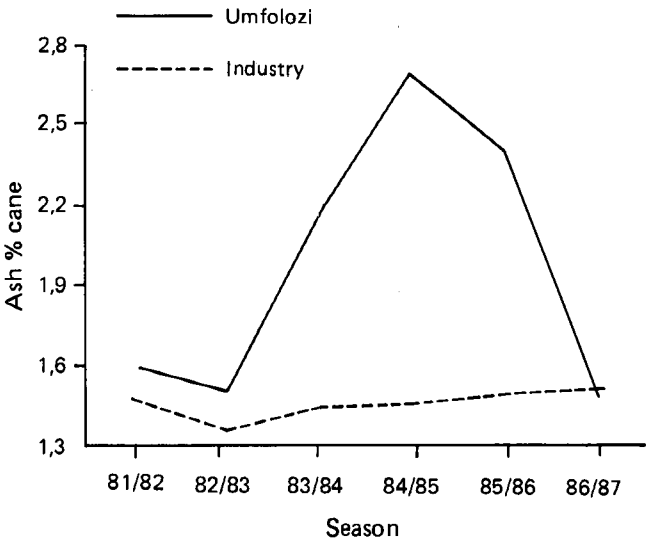


FIGURE 5 Ash % cane – Umfolozi vs industry average.

This coincided with the development of the present Industrial Field Record System (FRS) which after a trial was offered to all growers at the beginning of the 1986–87 season. Many of the specifications incorporated in this scheme were derived from the results and experience gained from the original Experiment Station project.

The analysis of records provides a useful extension tool. The interpretation of the crop status, for example variety performance on the farm, can provide solutions to problems (Table 3). The grouping of farms into homogeneous production areas or other convenient groupings provides an opportunity to compare production levels with the group average or maximum, and with the estimated potential for the area (Table 4).

Table 3

Yield data by variety, 1973–74 to 1978–79

Variety	Total area cut (ha)	tc ha^{-1} mth^{-1}
NCo376	470	4,81
NCo310	487	3,72
N55/805	223	4,91
CB36/14	85	6,10
N53/216	103	3,70
N7	10	3,85
NCo382	37	3,50
NCo293	51	2,52
N50/211	5	5,00
Mixed	45	4,87
Total/ average	1 516	4,52

Table 4

Production figures of homogeneous areas for the 1978–79 seasons

Area	ha	Mean age (mths)	tc h^{-1}	tc h^{-1} mth^{-1}
Coastal	474	16,8	110	6,54
Coastal hinterland	1 602	16,7	84	5,02
Rising plateau	1 410	16,9	92	5,47
Upper plateau	836	19,0	111	5,89

On the north coast the analysis of field records suggested that losses could be the result of excessive age of cane at harvest. This resulted in further extension projects being initiated on the computerisation of cutting programmes to avoid unsatisfactory cutting cycles, and a current project on programme planning.

At present, there are approximately 326 participants in the FRS throughout the industry, with a large percentage of growers in the Eastern Transvaal and Umfolozi contributing to it (Table 5).

Table 5

FRS participants by mill area

Mill	FRS Participants	Total Growers	%
Felixton	5	165	3
Amatikulu	34	156	22
Darnall	6	78	7
Maidstone	14	79	18
Mount Edgecombe	17	59	29
Gledhow	18	122	15
Small growers	2	270	0,7
Pongola	15	168	9
Noodsberg	20	183	11
Illovo	27	76	36
Sezela	20	102	20
Umzimkulu	14	176	8
Glendale	11*	12	92
Malelane	49	112	44
Union Co-Op	16	56	27
Umfolozi	58	113	50
	326**	1 927	17

* Glendale figures distorted by numerous small growers not eligible for FRS participation.

** 326 participants representing 5 120 000 tons or approximately 25% of total cane crushed by the industry.

The relatively small total number of growers participating in the system is disappointing, and while it may be possible in the Eastern Transvaal and Umfolozi areas and others where a reasonable sample of growers are involved to use the information in a constructive way, many more participants will be required before any conclusions can be drawn from the system for the industry as a whole.

Seedcane improvement schemes: projects to promote the use of better quality seedcane have been initiated in a number of extension areas, particularly in Zululand and further north. Surveys in Zululand showed that growers were using seedcane of an inferior quality and only very little of the cane intended for use as seedcane was suitable (Figure 6).

A seedcane improvement scheme was introduced as a project in the central Zululand extension areas in 1980 (Tucker *et al.*[6]). Initially 72% of the growers in the area participated, but during the following two years the number of growers participating in the scheme increased to 90%. The efforts on the part of most growers to improve seedcane quality were reflected in reductions in the spread and incidence of diseases such as ratoon stunting disease (RSD), mosaic and smut. However, the elimination of volunteers was inadequate and the level of mixed varieties remained unsatisfactory.

In 1984, LP & DC Committees established centralised seedcane schemes throughout Zululand. These schemes, introduced initially on a voluntary basis and recently made compulsory, have resulted in seedcane of a much better quality being used. RSD has been almost eliminated from the

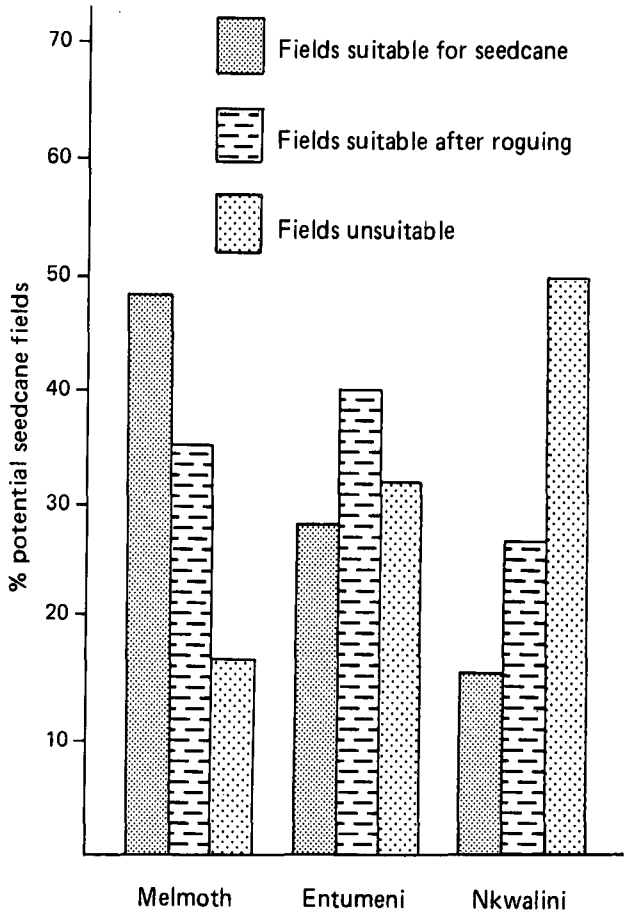


FIGURE 6 Suitability of potential seedcane fields 1980.

seedcane, while the incidence of other diseases has been reduced to an acceptable level. Seedcane schemes in the Umfolozi area and in the Eastern Transvaal have resulted from extension projects which have, in addition to improving quality of seedcane, motivated the use of the new higher producing varieties (Table 6). The value of seedcane projects is not easy to quantify, but growers using good material for propagation report increased yields and greater numbers of productive ratoons.

Table 6

Eastern Transvaal - varieties as a percentage of total area under cane

Variety	1982-83	1986-87	1987-88
NCo376	80,0	18,0	9,3
J59/3	6,7	4,0	2,5
N11	4,0	2,0	1,1
N52/219	15,0	8,0	4,7
NCo334	3,0	1,0	0,5
N14	–	63,0	71,7
N17	–	–	7,2

An extension training and evaluation project for small growers: a pilot project was initiated in 1983 in an attempt to establish a method for effective communication with cane growers of limited education, who produce crops on areas averaging 1,5 ha. Details of the project were reported in 1987 (Pike[5]).

Poor ratoon maintenance was identified as the principal reason for the failure of growers to sustain acceptable levels

of production. The need to initiate and develop group involvement was recognised. The project involved a small group of growers near Illovo and the practices of weed control and fertilization received the most attention.

Field days, discussions and demonstrations were held and evaluations of the extent to which recommended practices had been adopted were continually made. As a result yields at harvest obtained by growers in the group were, on average 123% better than those of the control group; 83% of the growers concerned had adopted the recommended practices (Figure 4). However, the long term success of any project such as this one would depend on continual motivation of the participants by the project team.

The encouraging results of this pilot project have led to similar projects being established on the north coast by the two principal milling companies, in their development schemes, with Experiment Station assistance, and using similar extension methods. There has already been a very noticeable change in grower attitudes as a result of these projects; one company is increasing the number of projects and engaging additional staff to manage them.

There is good reason to believe that the productivity of the small cane producer can be significantly improved by this method of technology transfer and evaluation.

More effective irrigation: the Experiment Station has for many years endeavoured to promote the more effective use of irrigation, but has had limited success.

A continuing regional project is now in progress in the northern cane growing areas with the objective of improving irrigation management and techniques. This includes a project involving the Umfolozi/Umsunduze Irrigation Study Group, in an area where poor quality irrigation water is used on marginal soils, and a project on irrigation control in the Pongola area. For both projects growers have had to know more about, and to apply better management techniques to the soils on their farms.

Particular emphasis has been placed on irrigation scheduling in Pongola, by use of a pegboard system designed by the local Extension Officer. (George[1]). It is effective and easy

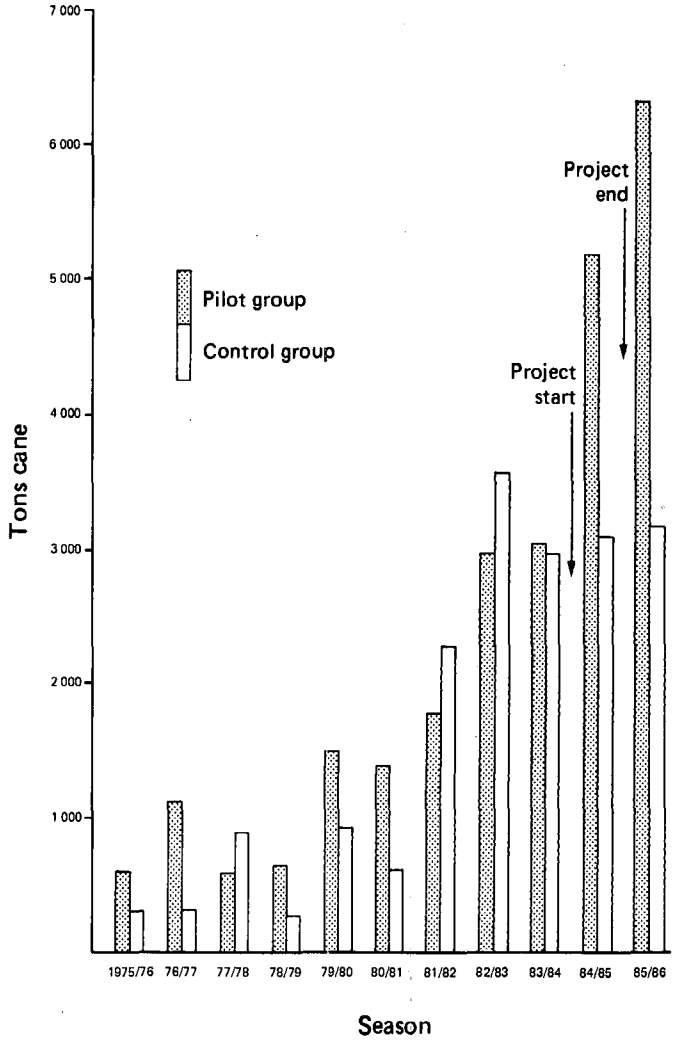


FIGURE 7 Tons cane produced pilot scheme vs control group 1975 to 1986.

Table 7

Results from Farm A using flood irrigation (George[1])

Year	Mean average age at harvest (mths)	Mean Yields						Rainfall on crop (mm)	Irrigation applied (mm)
		tc ha^{-1}	tc ha^{-1} mth^{-1}	tc ha^{-1} 100 mm^{-1} water	ts ha^{-1}	ts ha^{-1} mth^{-1}	ts ha^{-1} 100 mm^{-1} water		
1984	14,0	96,1	6,8	3,9	11,9	0,85	0,48	1 061	1 418
*1985	12,3	101,7	8,1	5,3	14,3	1,15	0,74	489	1 443
1986	11,4	106,7	9,3	6,8	14,4	1,26	0,92	535	1 030
1987	12,5	113,8	9,1	6,0	15,6	1,25	0,83	559	1 327

Results from Farm B using sprinkler irrigation

Year	Mean average age at harvest (mths)	Mean Yields						Rainfall on crop (mm)	Irrigation applied (mm)
		tc ha^{-1}	tc ha^{-1} mth^{-1}	tc ha^{-1} 100 mm^{-1} water	ts ha^{-1}	ts ha^{-1} mth^{-1}	ts ha^{-1} 100 mm^{-1} water		
1985	14,8	106,8	7,1	5,3	14,1	0,95	0,69	561	1 481
*1986	12,6	115,6	9,1	7,3	15,0	1,18	0,94	553	1 042
1987	14,2	123,2	8,7	8,0	15,7	1,10	1,01	527	1 015

* Scheduling started in October 1986.

to manage, and involves minimal documentation. The basic concepts of irrigation scheduling and more effective water use have been promoted through productivity groups and, as a result, 20 scheduling boards have been requested and 18 are in operation. Because sugarcane must be grown under irrigation at Pongola, the efficient application of water is the single most important factor which determines yield and to a large extent cane quality. There is already evidence in the area of the advantages of planning the application of irrigation water to take account of soil type, rainfall, season and crop growth stages (Table 7).

It is encouraging that growers in the Eastern Transvaal and Umfolozi areas also are showing interest in this system of scheduling irrigation.

Conclusion

Agricultural extension can be defined as the process of stimulating change among farmers through the adoption of improved techniques, resulting in greater productivity and profitability.

Extension projects are a means of evaluating the performance of extension agents, improving their credibility and providing them with job satisfaction. That the cost-effectiveness of extension is questioned is often due to work programmes being prepared in a manner which makes evaluation either impossible or very difficult.

In most of the projects reviewed in this paper there has been an obvious and measurable improvement of productivity. In such projects as the introduction of an analysis of field records and the promotion of seedcane schemes, the effect on productivity is less easy to quantify. Nevertheless, the results achieved by the Extension Officer are reflected in both instances by the number of growers adopting the recommended practice.

Visits to farmers on an *ad hoc* basis must remain as an important part of an Extension Officer's function. Experience in Australia has shown that where this has been neglected as a result of the introduction of payment for extension services, contact with the farming community as a whole has been lost, to the detriment of the agricultural industry. This method of extension alone however, provides little opportunity for the measurement of its effectiveness and job satisfaction must be difficult to achieve.

There are obvious advantages in planning a project together with the grower community with which the extension officer is involved. Examples of this are the cane quality campaigns operating at the mills in the midlands. and at Umfolozi.

The Experiment Station extension service can make a very significant contribution to the productivity of our sugar industry, provided it is recognised and used in a realistic manner. Real success in any extension campaign can best be achieved by growers themselves becoming involved in the planning and implementation of the campaign.

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