

THE DEVELOPMENT AND ACHIEVEMENTS OF THE FELIXTON LP&DC COMMITTEE

By AK MATHEW, RR FORTMANN and AB TUCKER

South African Sugar Association Experiment Station, Mount Edgecombe

Abstract

Local Pest and Disease Control (LP&DC) Committees were established in 1982 for each Mill area in the industry. The development method of operation and achievement of the Felixton LP&DC Committee's programmes after eight years in existence are described. Results from surveys and the effectiveness of the Committee's policies, which were established to contain and control the major pest and diseases, are included. The survey data identified problem areas and indicated possible causes of the problems. The Committee was thus able to set standards and impose specific management practices for growers to follow. The results indicate some of the factors which influence the cane stalk borer (*Eldana saccharina*) infestation and how eldana levels have declined substantially. The decline in the infestation of smut (*Ustilago scitaminea*) and a steady improvement in seedcane quality are discussed and how these changes were induced by the Committee's actions. The benefits of training farm labour for pest and disease field work are also discussed.

Introduction

The Felixton and Empangeni LP&DC Committees were first established in 1982 (Paxton4) and in 1985 they merged when the Felixton II sugarmill was opened and the Empangeni and Felixton I mills closed. The Committee is responsible for a cane area of 32 500 ha and there are 150 commercial quota holders. The Committee is financed by a Sugar Association grant, which amounts to 48% of the total budgeted for 1989, and the growers contribute the balance, which in 1989 was based on a levy of 4c/ton. The total budget for the 1989/90 season amounted to R194 000.

Growing conditions vary considerably between the various supply areas:

Felixton: includes the Umhlatuzi flats where soils are generally deep and free draining; the rainfall pattern is usually good and growth is normally excellent.

Empangeni: has mostly good soils and rainfall is adequate in normal seasons.

Heatonville: has a high proportion of shallow soils with inferior physical properties; rainfall is marginal and very erratic, and stress occurs frequently.

Nkwaleni: is fully irrigated; the soils are variable but production levels are reasonably high. Some stress from poor drainage conditions may occur.

Method

The Felixton Committee comprises nine grower representatives, and the executive director of the Felixton Mill. The Tongaat Hulett representative for extension services to small growers, and one small grower representative, the Mill Group Board chairman, the SASA Extension Officer, the Technician and a part-time secretary are ex officio members. Initially the committee functioned with a significant administrative contribution from the SASA Experiment Sta-

tion, but it is now fully autonomous, relying on only technical advice from Experiment Station staff.

The Technician, who is responsible for implementing Committee programmes, controls two mobile teams, each with a supervisor and four inspectors, all of whom are fully trained in pest and disease identification work. All field surveys are conducted according to the procedures established by the SASA Experiment Station.

In the early years, the field work concentrated mostly on eldana surveys, as this pest was ravaging the cane crop on many farms. Regular, random surveys were carried out on all farms to establish the distribution and severity of the problem. Random disease surveys and seedcane inspections were also carried out annually.

As the Committee gained experience a more balanced programme developed, and a better understanding of the problems permitted the strategy to be modified. Action steps were established and in time, follow-up visits to problem farms were made where this was considered necessary.

From 1987 onwards, the policies of the Committee had become well established and these were formalised in a handbook entitled "Regulations and Guidelines for Growers in the Felixton and Empangeni Groups", which was distributed to all growers. The regulations, which are mandatory, were based on the evidence of the accumulated data from the field surveys and were therefore applicable to local conditions.

The current regulations are:

1. (For eldana control). Cane age must not exceed 17 months at any time.
2. Where eldana levels exceed 10 e/100 stalks during the milling season, cane in the affected field must be harvested within three weeks.
3. When the mill is closed cane with very high levels of eldana may have to be destroyed.
4. To ensure that all cane, particularly carry-over cane is carefully monitored, growers must list (in their first estimates) details of all fields.
5. For smut control growers must rogue all commercial fields a minimum of four times in the summer.
6. Fields with smut levels in excess of 5% must be rogued immediately, and if this level is exceeded after further inspection, the cane must be eradicated.
7. Growers may plant only varieties N12, N14, N17, N18, N19, N21, CP666/1043 and NCo376.
8. Membership of the Felixton Seedcane Scheme is compulsory. Farm nurseries must be established in clean land with certified seed, and seedcane may not be planted into commercial fields unless it falls within the standards of 0,1% or less for disease and off types and is free from RSD.

In addition it is recommended that growers pre-trash all carry-over cane; reduce the area planted to NCo376; plough out cane with RSD and follow the necessary hygiene procedures; adopt a roging programme for smut control; and have trained labour on the farm to carry out pest and disease control practices.

Results

Eldana

Initially eldana surveys were conducted on every farm in turn with the grower selecting the fields to be inspected. Six to eight fields were inspected per team each day. Most farms were visited two to three times per year on a rotational basis. During the period 1980 to 1984, eldana counts in excess of 50 e/100 were often recorded. After a few years the distribution pattern of eldana was established and problem farms were noted for follow-up action.

The Committee met every month to study the accumulated survey data and assess the trends.

Eldana levels reached the first and highest peak in 1984 in all areas as shown in Fig 1. Further peaks occurred in 1987 and 1988, after which there was a sharp decline.

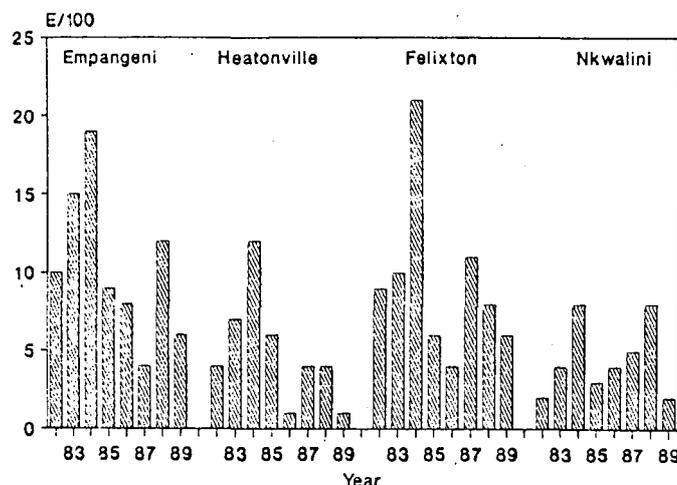


FIGURE 1 Mean eldana levels from field surveys between 1982 and 1989

Results from the Heatonville area showed consistently lower levels of eldana. This was surprising as it was considered that the poor soils and marginal rainfall for that area would have made it potentially more susceptible to eldana infestation. Because a high proportion of the Heatonville cane is harvested annually, and the cane fields are fragmented by veld and bush, the spread of eldana has perhaps been restricted and this may have resulted in comparatively low eldana counts.

In the irrigated Nkwalini area the cane is seldom subjected to moisture stress, it is harvested annually and hence eldana counts are generally low.

The problem areas on which the Committee began to focus attention were in the Empangeni and Felixton districts, where eldana levels were much higher. From 1984 onwards more surveys were done on farms where eldana was a problem in order to locate the worst affected fields and to observe how eldana populations behaved in selected fields by surveying them monthly. In this way the association of moisture stress, excessive cane age, and susceptible varieties with high eldana numbers as described by Atkinson and Nuss¹, Carnegie and Smail² and, Nuss *et al*³ were corroborated.

Fig 2 illustrates the monthly eldana levels from field surveys and rainfall means between 1982 and 1989 for the Empangeni and Nkwalini areas. A peak in eldana levels was reached between November 1983 and April 1984, following a long period of below average rainfall between May 1982 and May 1983.

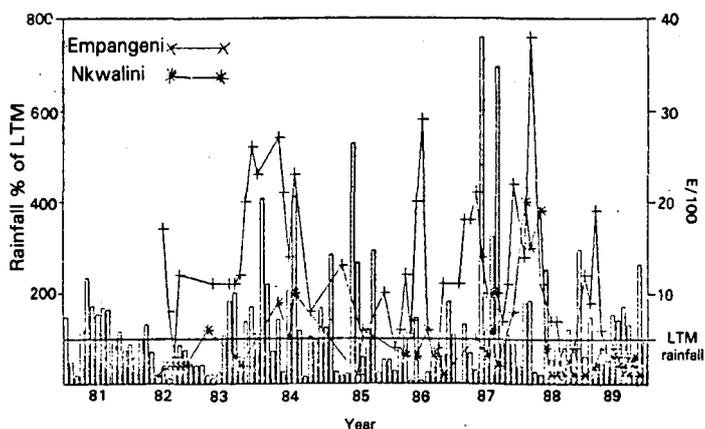


FIGURE 2 Eldana numbers from field surveys in the Empangeni and Nkwalini areas relative to rainfall from 1982-1989

A similar drought between November 1985 and November 1986 was followed by another eldana peak which developed between May and October 1987. There are indications that sharp increases in eldana levels can be expected approximately six months after a long period of drought.

The most recent peak in eldana numbers occurred between October 1987 and March 1988, following prolonged periods of high rainfall. This resulted in widespread waterlogging of lands which also caused stress to cane, contributing probably to the high eldana levels at Nkwalini about four months later.

As data accumulated and knowledge about eldana increased, the Committee was able to specify relevant standards for eldana control. A hazard level was set and growers were instructed to harvest cane in specific fields within a predetermined period, and where necessary, the Mill Group Board co-operated by increasing delivery allocations. This ensured that high risk cane was not left standing or carried over to the following season.

It became evident too that eldana numbers seldom reached hazardous levels in cane younger than 12 months old and the extent of stalk damage was slight. On cane 16 months of age and older, eldana levels often increased rapidly and beyond 18 months high eldana counts were common and stalk damage could be severe.

With this evidence the Committee stipulated 17 months as the maximum permissible age at harvest. Action was taken if growers allowed cane to exceed the age limit. Growers responded positively to this requirement. The results showed that in 1985 111 of the fields surveyed exceeded the age limit; by 1987 the numbers had dropped to 45 and in 1989 all fields surveyed were younger than 17 months. This situation corresponded with the lowest mean levels of eldana recorded for five years.

As the Committee's strategy for eldana control developed, priorities in the survey programme changed. Surveys were concentrated on farms known to be infested with eldana, whereas those with lower eldana numbers and where management was complying with the regulations, were surveyed less frequently. Additionally growers were requested to carry out surveys of their fields using their own trained staff. In this way eldana problems were detected earlier and the grower could take appropriate action much sooner. The number of fields surveyed for eldana by the teams reached a peak of 2 347 in 1986, and this declined by half to 1 179 in 1989, thereby releasing the teams for other work.

The survey data indicated clearly the relative susceptibility and tolerance of varieties to eldana. The mean eldana

numbers found in four varieties from the surveys conducted in 1988 and 1989 are given in Table 1. Lower levels of eldana and percentage stalk red were recorded in N12 compared with NCo376 and varieties N14 and N18, which were affected to an intermediate extent.

Table 1
Mean eldana levels and the % stalk red in 4 varieties from field survey data collected in 1988 and 1989

Variety	Area (ha) surveyed	Eldana/100 stalks	% stalk red
NCo376	5 532	9	2,5
N12	455	3	0,9
N14	402	7	1,8
N18	499	5	1,5

The measurement of percentage stalk red has recently been introduced and is a useful indicator of the percentage of the internal tissue of the stalk damaged, mostly by eldana. It is evident from Table 1 that variety N12 showed only 36% of the damage recorded in NCo376.

When regular inspections on farms indicated high eldana numbers despite adequate soil moisture and a young age at harvest, closer examination of the data usually indicated too high a dependence on variety NCo376 and/or excessive applications of nitrogen fertiliser.

By using the survey data and being aware of the factors contributing to eldana damage, the Committee has been able to use its resources effectively in problem areas to reduce eldana numbers and damage to cane to more acceptable levels, and to lower the risk of a spread to neighbouring farms.

Smut

Prior to the establishment of the LP & DC Committee smut was not considered to be a problem in Zululand except for a few susceptible varieties. Once the Committee embarked on a programme of comprehensive disease surveys in commercial cane fields, a much greater extent of smut incidence was appreciated. The annual survey programme was based on samples of 6 to 10 fields (selected by the grower), on every farm, and carried out during the period September to February.

The initial survey data showed that the incidence of smut was relatively high. The intensity of infection as mean percentage smut in the four areas during the period 1983 to

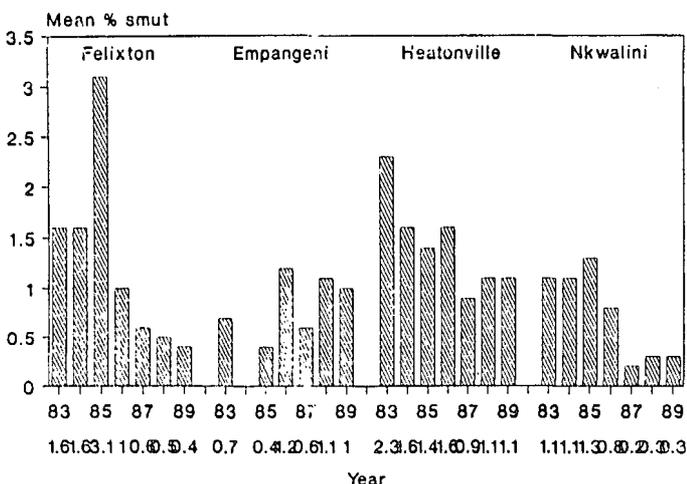


FIGURE 3 Mean % smut in four areas from 1983-1989

1986 is shown in Fig 3. The levels were unacceptably high and the Committee was concerned about the probability of the disease spreading because about 90% of all fields were infected with smut, except in Nkwalini where the level was about 70%.

The Committee began its smut control programme in 1984 when it withdrew first NCo310 and then N55/805 from the list of approved varieties. Growers were given five years in which to eradicate the two varieties and by 1989 very little area under these varieties remained.

Analysis of the field survey data from the Felixton and Empangeni areas showed that smut incidence had been increasing in NCo376 while the newer resistant varieties, e.g. N12, N14 and N18, had much lower levels as shown in Fig 4.

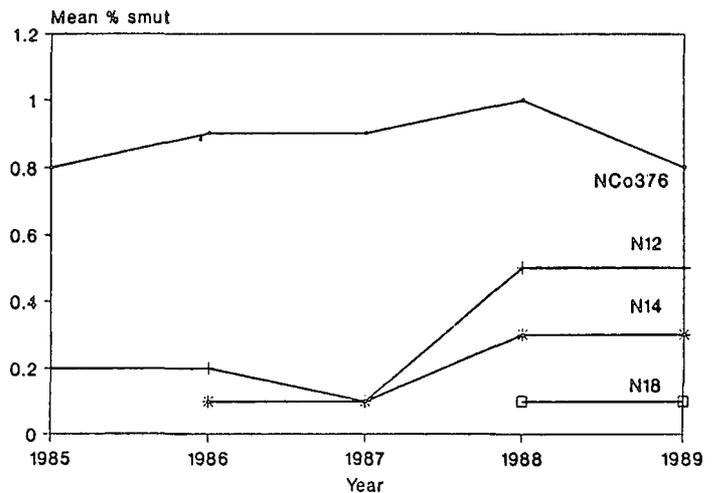


FIGURE 4 Mean % smut levels in four varieties from field surveys, 1985-1989

In view of the large area planted to NCo376 the Committee adopted a "smut strategy" in 1986 to prevent smut becoming a serious problem in this highly productive variety. It was recommended to growers that they reduce the area of land under NCo376 to 50% or less; to replace NCo376 with smut resistant varieties; to use the fungicide Bayleton when hot water treating NCo376 and to rogue smutted stools from nurseries and commercial fields at four to six week intervals in summer.

Growers generally responded positively to the strategy. Over 50% of the cane area in Nkwaleni is now planted to N14 and N17 with similar trends in the other areas. All growers participate in the seedcane scheme which ensures the use of smut-free seedcane, and the number of growers who follow a roguing programme is increasing each year.

As evident in Fig 3 there are indications that smut levels in each area have declined since 1986. Whereas in 1983 fifty fields surveyed were infected with levels of smut in excess of 5%, there were only five such fields in 1989.

Ratoon stunting disease (RSD)

Prior to 1986 most of the surveys for RSD were done on potential seedcane with only a limited number of commercial fields being surveyed. The mean level of infection then was about 11%, which is unacceptably high.

In 1987 the LP & DC Committee therefore embarked on a 4-year programme to obtain a broader assessment of the incidence of RSD by sampling all farms. Six fields with cane crops of at least 3rd ratoon were sampled per farm. In order to ensure that the sampling procedure is done correctly the survey teams take the samples and deliver them to the Ex-

periment Station at Mount Edgecombe. The available survey data show that the cane on about half the farms is infected and 20% of all fields are infected with RSD. The relevant growers are sent a warning letter detailing the action steps to be followed. These include a recommendation to plough out infected cane after the next harvest, strict hygiene practices at harvest and further testing of other commercial fields. Follow-up visits by the Technician ensure that these requirements are carried out.

When the first round of surveys is complete a new programme of more detailed sampling on farms with RSD-infected cane will follow. The relatively high incidence of RSD has necessitated its control receiving high priority on the Committee's pest and disease control programme and of which the seedcane scheme is an integral part.

Seedcane

The formation of an informal seedcane improvement scheme was initiated by the Extension Officer in 1981 to improve the low quality of seedcane being used in the area. For the first time growers were being asked to plan ahead for their seedcane requirements. After three years however RSD was present in 11% of the nurseries and 39% of them contained many off-types. Only 37% of the nurseries were approved, although a further 24% required only light roguing before further inspection. Smut levels were occasionally excessive.

In 1984 the Committee considered the quality of seedcane material to be unacceptable and decided to tighten the control of production and quality of seedcane. A seedcane sub-committee of the LP&DC Committee was formed, and in 1985 growers were persuaded to participate in a formal seedcane scheme, which became obligatory for all growers in 1986. By 1989 nearly all commercial seedcane had been propagated through the scheme.

Table 2 shows the results of inspections of farm seedcane nurseries during the first three seasons of the scheme. Most failures resulted from excessive levels of off-types due to the seedbeds being contaminated by residues of the previous crop. Levels of smut were generally within the prescribed limit and very little RSD was recorded.

By 1989 there had been a steady improvement in the quality of seedcane in nurseries with 46% being approved and 34% requiring light roguing (levels between 0,1 and 0,5%). The failure rate had declined to 20%, compared with 34% in 1987 but the desired quality of seedcane has still to be achieved.

Training

The extent of pest and disease problems and the difficulty being experienced in improving the seedcane quality is such that the Committee has inadequate survey teams to undertake all the surveys at the required frequency or at the most appropriate time. Consequently it is now promoting a training programme, using some of the survey team members to

train selected farm staff to carry out routine field work such as roguing for smut and off-types, eldana surveys and nursery hygiene procedures. During 1988 and 1989, 318 workers from 54 farms were trained by the Committee's survey staff.

The benefits from training farm staff are considered to be substantial, and well trained staff have successfully reduced very high smut infection levels. For example, in a period of one year by effective roguing, in some fields at Mposa, smut levels of 9 to 29% have been reduced to acceptable levels of 1% and lower.

The Felixton Committee aims to have trained staff for pest and diseases control work on every farm in their area. Regular in-service training for the inspection teams and periodic monitoring of their standards of efficiency are also essential in order to maintain the correct standards and uniformity of survey work. The Technician is responsible for team efficiency and productivity, which is difficult to control in the field. Unannounced checks in the field enable him to assess the quality of their survey work.

In addition, quarterly tests are carried out to check the inspectors' ability to identify diseases and varieties. If there is doubt about the accuracy of survey data the second team is delegated to re-survey the same field, unaware that it is for the purpose of checking. The Technician then compares and discusses the results with the team's members.

It is essential that the surveys of nurseries are precise, particularly in regard to variety identification. The Technician has observed that inspectors tend to be less efficient as the day progresses, perhaps from fatigue or boredom, and fewer off-types may be recorded. In order to overcome this problem the Technician has devised a technique whereby each cane row in every nursery is surveyed by an inspector who can be identified. This enables the Technician to identify the source of unlikely results. This together with other measures has been a motivating force to maintain a high level of efficiency and errors are kept to a minimum.

Discussion and Conclusions

When Pest and Disease Committees were first established, committee members and survey staff had little experience and limited background information. With experience however survey techniques improved and the data were used more effectively. The Committee formulated standards which later became regulations to ensure that growers adopted the necessary practices to contain the spread of eldana. It was then possible to reduce the area surveyed for eldana by concentrating on the farms where eldana was known to be a problem. This gave the Committee extra scope to undertake more detailed disease surveys and to set standards and management practices necessary for the control of smut and RSD. Subsequently it was possible to reduce the time spent on routine disease surveys and concentrate on problem farms. The extent of the disease problems prompted the next development, which was the introduction of an official seedcane scheme. Logically this became the main component of

Table 2
Results from farm seedcane nursery inspections from 1987 to 1989

Year	First inspection			Second inspection		
	% approved	% requiring attention	% rejected	% approved	% requiring attention	% rejected
1987	—	—	—	32	34	34
1988	28	47	25	39	26	35
1989	39	26	35	46	34	20

the teams' programme as it was seen to be the starting point for all the other control measures. The proportion of time spent by the survey teams in 1989 on the various components was as follows:

Seedcane	- 43%	RSD	- 9%
Eldana	- 30%	Training	- 2%
Disease	- 16%		

The Committee considers this to be a realistic division of time according to current priorities.

The LP & DC Committees activities were at times resented by a small minority of growers. Strong leadership by Committee members and regular reports back to growers ensured full support in time from the various grower groups. Most growers now have a full understanding and acceptance of the *modus operandi* of the Pest and Disease Committee and the necessary procedures to be followed.

The achievements of the Committee in its nine years of operation are significant and are clear testimony to the need for its existence. Eldana populations, although strongly affected by weather patterns beyond the control of the grower, have been reduced with the adoption of recommended practices. The intensity of smut has declined steadily over the past three years; there has been some improvement in the incidence of RSD although this cannot be reduced quickly in the short term; and there has been an improvement in seedcane quality. In addition there is an increasing number of farm staff who have received training in pest and disease work.

The Committee has had to control costs strictly especially with the reduction in financial support from the Sugar Association. The levy is hotly debated each year and while its acceptance is inevitable, growers insist on it being kept to the minimum necessary to keep the service operating effectively. Teams have been reduced in size, making a real saving without any loss of efficiency.

Membership of and contribution to the Committee are always good, and the deliberations are positive. However, members are always reluctant to face fellow growers on confrontational issues, although they are willing to discuss problems with them.

Committee programmes in the future are likely to continue to concentrate on improving seedcane quality, the effective elimination of all previous crop residues in nurseries and commercial fields, and the elimination of RSD. Training will be a continuing aspect of the programme in order to increase the intensity of survey work and improve hygiene practices on the farm.

The maintenance of varietal purity and the performance and optimum use of released varieties could become another component of future programmes.

There can be no doubt that the Felixton LP & DC Committee has played a significant and effective role in improving grower awareness of the pest and disease problems in the area. It has persuaded them to introduce the necessary changes in their management practices to improve the situation, but there remains considerable scope for further improvements to be made.

REFERENCES

1. Atkinson, PR and Nuss, KJ (1989) Associations between host plant nitrogen and infestations of the sugarcane borer, *Eldana saccharina* Walker (Lepidoptera : Pyralidae). *Bull ent Res* 79, 489-506
2. Carnegie, AJM and Smaill, RJ (1980). The incidence of moth borers in South African sugarcane during the 1979/80 season. *Proc S Afr Sug Technol Ass* 54, 154-157
3. Nuss, JK, Bond, RS and Atkinson, PR (1986). Susceptibility of sugarcane to the borer *Eldana saccharina* Walker and selection for resistance. *Proc S Afr Sug Technol Ass* 60, 153-155
4. Paxton, RH (1982). Eldana borer (*Eldana saccharina*): the results of surveys. *Proc S Afr Sug Technol Ass* 56, 99-103