INVESTIGATIONS IN THE CONTROL OF WIREWORMS (*Lacon variabilis* Cand.) IN CANEFIELDS WITH "GAMMEXANE."

By W. A. McDOUGALL, M.Sc., Entomologist, Bureau of Sugar Experiment Stations.

SUMMARY.

Amounts of "Gammexane" (10% dust containing 1·3% gamma isomer of benzene hexachloride) ranging from 12½ lb. to 400 lb. per acre were applied to cane setts either directly or after a shallow soil cover had been applied.

All direct-application treatments gave complete or nearly complete control of wireworms, but the rooting of setts was very much reduced.

Indirect application gave a substantial degree of control of wireworms for all amounts of "Gammexane"; with the higher dosages there was a marked toxic effect on rooting, but this was not excessive with amounts of less than 50 lb. per acre.

INTRODUCTION.

On a number of occasions wireworms have been reported as damaging sugar-cane setts in several districts in Queensland. However, these pests (chiefly *Lacon variabilis* Cand. with at most a one-year life cycle), though varying in degree of infestation and activity in different years, are a more or less constant worry to many farmers in the Mackay and Proserpine districts, and particularly to those with drainage problems on forest lands. Critically viewing these districts as a whole over a number of years, wireworms must rate with grubs* as the two most serious pests of cane, though damage caused by the latter is more impressive to casual observers. The immediate result of attacks by wireworm is poor strikes, which leave "gappy" stands unless "supplied" or ploughed out and replanted. The indirect but less often appreciated effect is interference with farm routine and practices. For example, because of the fear of wireworms, breaking-up may not be undertaken until after the wet season, green manures are not used, normal fertilizing is varied and planting is delayed.

During the last two decades, peak years of wireworm infestation were witnessed in 1928 and 1937; the infestation of 1943, in comparison, was mild. Following the extensive damage of 1928-30 an investigation of these pests was carried out (McDougall, 1934a, 1934b, 1935). On the basis of life-history studies in the laboratory, and field observations of the behaviour of the pests, control recommendations were formulated which indicated the necessity for the provision of better drainage during the wet season prior to planting and the judicious selection of planting times. It was evident that varieties and the chemicals available at that time were of little value in combating wireworms.

* Mainly *Dermolepida albohirtum* Waterh. and *Lepidiota frenchi* Blbk.

From 1935 onwards it was possible some months before planting times to issue warnings of the probable intensity of wireworm attack throughout the central cane-growing districts. Most of the forecasts were correct, but as with the recommendations on drainage were to a great extent ignored. Any value from drainage so far as wireworm control was concerned was usually secondary; where drainage had been undertaken for general agricultural purposes, and was timed to keep down wireworm populations, the pests were controlled automatically. Perhaps the chief reason for this state of affairs is bound up with the difficulty of assessing in advance the probable wireworm attack *in particular fields* in any season. During 1932 and 1933, and again in 1937-38, efforts were made to place wireworm control on a quantitative population basis—that is, to estimate the population level of wireworms which would cause commercially serious damage in different fields. A large number of man-hours of labour is required for this type of investigation; the staff available did not allow for very full or satisfactory work. Moreover, there were obvious indications, as also found by Cockbill *et al.* (1945) in England, that the number of wireworms present does not always indicate the degree of damage which may be experienced subsequently. Using the standard soil sample-sieving (and also flotation) method of estimating wireworm populations, and making due allowances for weaknesses in this type of work, it was found that up to 50 per cent. of misses occurred in some fields with negligible pest populations. On the other hand, under different conditions good strikes have been obtained in the presence of 20 times the corresponding number of wireworms.

For some years, groups of trial setts were used prior to planting in Mackay fields. Often these would yield excellent strikes and the following main plantings show severe damage. Young primary shoots of a good stand may also suffer appreciably from "dead hearts" caused by an unexpected attack of wireworms, which, in the central districts, often show increased activity in a dry spring or during other dry periods after a shower of rain.

The behaviour of the pests as discussed above is known to the average farmer, who in many instances considers wireworms a farm hazard which, so far as our present knowledge goes, cannot always be avoided economically except by a very late planting, and this in itself is a gamble. He meets the problem by making a normal late planting, and in years other than wireworm peak years secures in many fields a satisfactory stand in about half of his plantings. If necessary he supplies or re-supplies the misses. A cutter-planter attachment for this purpose has been described by Skinner (1946). A full stand for ratooning is sometimes aimed at; in one exceptional instance a 10-ton per acre plant crop was heavily supplied and yielded 27 tons per acre in the first ratoons.

It has been considered for many years that a recommendation for the control of wireworms in central district canefields must be, to a great extent, complementary to other factors (e.g., drainage) or should be in the form of an insurance against pests which, though present, may not attack the crop. Frequently their presence may not even be detected until after the damage

they have caused becomes evident. An effective control programme for the wireworm pest must be both cheap and easy to apply if it is to be used extensively and continuously by farmers.

In recent years some chemicals have been cited as of possible use against wireworms—e.g., 1, 1 dichloro-1-nitroethane (Woodworth, 1943) and dichloropropane-dichloropropylene (Stone, 1944). It is apparent that methods of application, results and costs over large areas such as canefields do not warrant more than a passing interest in these materials.

During the past two wars, wireworms have been given more than usual attention in Britain because of the urgent need for home-grown agricultural products. Over the years of World War II. an administrative control based on pest populations and varying crop susceptibility to the pests was introduced (Fryer *et al.*, 1942). The use of this type of control is very rare against wireworms and, as is often the case, it is most difficult to determine the real value of the work. At any rate, the basic ideas have little application in a monoculture, such as sugar-cane farming, where field cropping for the most part is varied only by varietal changes.

Towards the end of the war the development in Britain of an insecticide bearing the trade name "Gammexane"* was announced (Slade, 1945). To date, no critical details of work against wireworms with this material in other countries have been published; probably because, as with the author's work, only preliminary and exploratory data have been gathered. Short notes, such as by Thomas and Jameson (1946), Golightly and Hogg (1946) and Dunn *et al.* (1946), are available and two important points are made, viz., (1) the persistence of "Gammexane" in the soil; and (2) the quick immobilizing of wireworms by small amounts of "Gammexane."

PRELIMINARY TESTS.

In June, 1946, five small observation plots on the effect of "Gammexane" on wireworms were set out in the Mackay district. The effects of this material, even in low concentrations, on the primary rooting of cane (sett roots) were very severe.

In early June a large series of pot experiments was initiated with "Gammexane" concentrations in soil varying from 1:250 to 1:50,000 (insecticide unit was the 10 per cent. dust containing 1·3 per cent. gamma isomer of benzene hexachloride). It is too early to discuss these experiments in detail, but three observations are worthy of note:

(1) "Gammexane" was so persistent in the soil used that, with cane-sett roots as the indicator, its loss in strength was practically negligible over eight months. During this time artificial waterings were carried out when necessary, and the potted soil was also subjected to about 30 inches of wet-season rainfall within a month.

* The active principle of "Gammexane" is the gamma isomer of benzene hexachloride.

(2) The effect of "Gammexane" was more severe on primary than on secondary (shoot) rooting.

(3) Roots damaged by "Gammexane" did not recover.

Using the older larval instars of wireworms in "Gammexane" concentrations in soil of 1:1,500 quick immobilization was noticed, though in some instances deaths were not recorded at six weeks.

FIELD EXPERIMENTS.

There are, of course, a number of ways in which "Gammexane" could be used against wireworms. However, the following experiments were set out with due regard to the economics of the problem. No dosage-mortality data are available, and the use of populations as a criterion was avoided because of its proven unreliability.

Experimental Series I.

Site.—Lower end of Blocks C2-C7, Sugar Experiment Station, Mackay.

Dates.—Set out 12-17/7/46; taken up 3-6/9/46 when secondary rooting was commencing.

Method.—"Gammexane" applied by hand in land drilled to 7 ins. Material placed either on top of setts in bottom of drills (direct application) or after setts had been given a primary soil cover of one-half inch (indirect application). Final cover, 4 ins.

Planting Material.—Only the two top plants of H.Q.426 used. 30 setts (10 in each of three drills) per plot in all except observation trial 4, where only 10 setts per plot were used.

Counting Notation.—

D = Dead eyes.

C = Eyes still to swell.

S = Good shoots.

W = Eyes killed by wireworms.

P = Eyes or shoots killed by "black beetle" (*Metanastes vulgivagus* Oliff).

There are many factors concerned in estimating sett rooting (R); e.g., shoots will break ground without the support of sett rooting and roots will die once the eye is damaged. Estimated percentage rooting (R) is based on that of the few undamaged setts supporting shoots in the checks as representing 100 per cent.

In working out percentage strike (G) with regard to protection from wireworms the following facts have been taken into consideration:

(1) Wireworms do not attack dead eyes or eyes which are not swollen (except in the case of very soft eyes);

(2) Eyes damaged by black beetle have been discarded. Such attack on eyes is fortuitous, since the main attack is on the setts. It is apparent from sett damage that dosages of "Gammexane" suitable for protection against wireworms will not be adequate against this pest.

Soil Condition.—Cold. Moisture content somewhat uneven, but probably not exceeding 10 per cent. (Moisture content for good tilth, 15-18 per cent.)

Treatments.—Treatments were as shown in Table 1.

Table 1.

DETAILS OF SERIES I. TRIALS.

Plot.	Trial 1. 5 x 5.	Trial 2. 6 x 6.	Trial 3. Observation.	Trial 4. Observation.
A	100 lb.; direct ..	100 lb.; indirect..	400 lb.; indirect..	50 lb.; 2 in. to side of sett
B	50 lb.; direct ..	50 lb.; indirect ..	200 lb.; indirect..	50 lb.; 4 in. to side of sett
C	Check	Check	10 lb.; indirect ..	25 lb.; 2 in. to side of sett
D	25 lb.; direct ..	25 lb.; indirect ..	10 lb.; direct ..	25 lb.; 4 in. to side of sett
E	12½ lb.; direct ..	12½ lb.; indirect..	5 lb.; direct ..	12½ lb; 2 in. to side of sett
F	..	400 lb. paradichlorobenzene	5 lb.; indirect ..	12½ lb.; 4 in to side of sett

Quantities given represent pounds per acre (147 chains of running drill) of 10% dust containing 1.3% gamma isomer "Gammexane."

Trial 1: "Gammexane" mixed with soil for working purposes.

Trial 2: "Gammexane" applied in No. 1 Planting Mixture, the fertilizer at the rate of 320 lb. per acre. The approximate composition of the fertilizer was: nitrogen as blood and bone, 1.0%; water soluble P_2O_5 as superphosphate, 13.0%; P_2O_5 as bone, 4.0%; K as muriate of potash, 7.5%.

Results.—The observations and counts are given in the Appendix and those made in Trials 1 and 2 are summarized in Tables 2 and 3 respectively. Trials 3 and 4 were not replicated.

Table 2.

SUMMARY OF OBSERVATIONS IN TRIAL 1, SERIES I.

Treatment.	% Strike.	% Rooting.	Total Eyes.	D + C.	C.	D.	S.	S. + W.
A 100 lb./ac. ..	100	5	104	64·4	47·8	16·6	39·6	39·6
B 50 lb./ac. ..	100	5	97	51·4	37·4	14·0	46·0	46·0
D 25 lb./ac. ..	100	5	102	47·2	30·8	16·4	54·4	54·4
E 12½ lb./ac. ..	98·6	6	106	38·8	24·0	14·8	66·4	67·4
C Check	8·6	48	107	33·0	20·4	12·6	(6·4)	73·2
s.e.	..	..	± 2·86	±7·15	±5·39	±2·82	±9·07	..

All treatments gave complete control of wireworms, but all affected rooting very markedly.

Table 3.

SUMMARY OF OBSERVATIONS IN TRIAL 2, SERIES I.

Treatment.	% Strike.	% Rooting.	Total Eyes.	D + C.	D.	C.	S.	S. + W.
A 100 lb./ac. ..	89·5	63·3	95	19·5	14·7	4·8	65·5	72
B 50 lb./ac. ..	90·4	79·2	94	24·2	15·0	9·2	60·5	67
D 25 lb./ac. ..	90·4	85·0	94	19·2	15·7	3·5	64·2	71
E 12½ lb./ac. ..	78·5	85·0	93	12·7	10·0	2·7	59·3	76
C Check	(7·0)	47·5	94	13·2	8·3	4·8	(5·5)	79
s.e.	±1·78	±5·63	±2·24	±3·43	±2·11	..	±3·53	..

As judged by the figures for percentage strike, treatments A, B and D resulted in significantly better control of wireworm damage than treatment E, but all treatments were obviously better than the check. On percentage rooting all treatments were better than the check, but treatment A was significantly worse than treatments D and E. This indicates a marked toxic effect on rooting at the higher dosages. Combined, the results indicate that treatment D was the best in that it resulted in a high degree of control of wireworm attacks without any excessive damage to rooting.

Experimental Series II.

Working details were similar to those for Series I, except that soil conditions were drier. All applications were direct and the site was on a Walkerston farm. Summaries of counts and analyses of the two trials are given in Tables 4 and 5. The two observation trials of Series I were not repeated in this series.

The first two sets of figures were not analysed since the differences were obvious. All treatments gave almost complete protection from wireworm attack, but treatments A, B and D reduced the percentage rooting very

markedly. The difference between C and E, as far as root production is concerned, is not significant. The remaining analyses showed significant differences in the number of (D+C) eyes with treatment A, B and D relative to the check, also in the number of eyes still to swell (C) for treatment D over treatments C and E. For (S) the variation between the means for treatments A, B, E and D was not significant, but the number of shoots on the check plots was obviously less than on the treated plots.

Table 4.

SUMMARY OF OBSERVATIONS IN TRIAL 1, SERIES II.

Treatment.	% Strike.	% Rooting.	Total Eyes.	D + C.	D.	C.	S.
A 400 lb./ac.	100	6	116	38	24	14	77
B 300 lb./ac.	100	12	121	42	27	15	79
D 100 lb./ac.	100	8	106	41	21	20	65
E 30 lb./ac.	99·8	34	110	30	21	9	79
C Check	13·0	25	118	21	14	7	(13)
s.e.	..	..	±5·09	±4·67	±3·99	±2·74	±6·18

Table 5.

SUMMARY OF OBSERVATIONS IN TRAIL 2, SERIES II.

Treatment.	% Strike.	% Rooting.	Total Eyes.	D + C.	D.	C.	S.
A 40 lb./ac.	99·4	36	111	24	16	8	87
B 30 lb./ac.	99·8	48	116	28	22	6	88
D 20 lb./ac.	98·6	44	119	33	23	9	84
E 40 lb./ac. in No. 1 Planting Mixture	98·6	54	117	23	15	8	93
C Control	8·1	20	112	21	18	4	(7)
s.e.	..	±2·85	±4·98	±3·48	±2·28	±1·50	±3·76

All treatments resulted in a high degree of protection from wireworm attack. For percentage rooting all treatments were significantly greater than the check at the 1% level, while E was greater than A (1% level), E greater than D (5% level), and B greater than A (5% level). The differences in the other analyses were not important and, except for a few isolated extreme differences, were not significant. Since the number of shoots (S) on the check plots were obviously lower than on the treated plots the figures for C were not included in this analysis.

FURTHER OBSERVATION PLOTS.

In mid-September of 1946 an observation trial was set out on the three acres which had contained the Series I trials. For planting purposes an upright type cutter-planter fitted with fertilizer distributor and drill roller was used.

"Gammexane" (10% dust containing 1.3% gamma isomer) and No. 1 Planting Mixture were mixed in the proportion of 6 lb. to 160 lb. and the mixture was applied to alternate half-lands at the rate of 320 lb. per acre. A 54-in. row interspace was used. Application was effected by replacing the metal fertilizer chute with a piece of 1¾in.-diameter car radiator hosing simply held by wires so that the mixture fell slightly in front of the "run-in" of soil on the plants. This was equivalent to indirect application of "Gammexane." The remainder of the field was fertilized with No. 1 Planting Mixture at the rate of 320 lb. per acre.

This trial served to demonstrate the ease and uniformity with which the required mechanical experimental method of applying "Gammexane" could be translated to field practice.

The experimental field usually harbours active wireworms until late October, but in the spring of 1946, despite the obvious presence and activity of wireworms from July to September, the stand of cane obtained was the best for many years. There was a slight but discernible difference between the half-lands in favour of treatment.

GENERAL.

"Gammexane," as used under the field conditions encountered and described, has distinct promise against wireworms in canefields. The persistence of the material in soil is a good point, for cane eyes vulnerable to wireworms sometimes remain dormant for some months.

Observations on both pot and field experiments show that the effect of "Gammexane" on cane rooting is by contact and does not operate very far from the band of material.

Much detailed work remains to be done, particularly over a wide range of soil and weather conditions. Its prosecution is well worth while, because if "Gammexane" fulfills present promise and provides an economically sound control of wireworms it will be widely used in the Mackay and Proserpine districts.

ACKNOWLEDGEMENTS.

Summaries of the trial results were carried out, and analyses made, by the Department's Biometrician (Mr. P. B. McGovern). "Gammexane" for trial purposes was made available by Imperial Chemical Industries of Australia and New Zealand Ltd. The Mackay Cane Pest and Disease Control Board helped considerably with labour for the preliminary investigations reported.

REFERENCES.

COCKBILL, G. F., HENDERSON, V. E., ROSS, D. M., and STAPLEY, J. H. 1945. Wireworm populations in relation to crop production. 1. A large-scale flotation method of extracting wireworms from soil samples and results from a survey of 600 fields. Ann. Appl. Biol. 32 (2): 148-63.

DUNN, E., HENDERSON, V. E., and STAPLEY, J. H. 1946. Control of wireworms. Nature 158 (4017): 587.

FRYER, J. C. F. *et al.* Symposium on wireworm investigations. Ann. Appl. Biol. 29 (2): 144-96.

GOLIGHTLY, W. H. 1946. Modern insecticides and their use against wireworms. Nature 158 (4014): 488.

———————— and HOGG, W. A. 1946. Practical control of wireworms with "Gammexane." Nature 157 (3997): 772.

McDOUGALL, W. A. 1934a. The determination of larval instars and stadia of some wireworms (*Elateridae*). Qld. Agric. J. XLII. (1): 43-70.

————————. 1934b. The wireworm pest and its control in central Queensland sugar cane fields. Qld. Agric. J. XLII. (6): 690-726.

————————. 1935. Wireworms (*Elateridae*) and their control in Queensland sugar canefields. Proc. Inter. Soc. Sugar Cane Tech. 5th Congr., Brisbane: 583-7.

SLADE, R. 1945. A new British insecticide. The gamma isomer of benzene hexachloride. Chem. Trade J. 116 (3017): 279-81.

STONE, M. W. 1944. Dichloropropane-dichloropropylene, a new soil fumigant for wireworms. J. Econ. Entom. 37 (2): 297-9.

S[KINNER], S. O. 1946. Cutter planter attachment for supplying wireworm damaged fields. Cane Growers' Quart. Bull. X. (2): 105-6.

THOMAS, F. J. D., and JAMESON, H. R. 1946. Practical control of wireworms with "Gammexane." Nature 157 (3991): 555.

WOODWORTH, C. E. 1943. Tests using 1,1-dichloro-1-nitroethane against wireworms. J. Econ. Entom. 36 (2): 335.

APPENDIX.

TRIAL 1.

C	%	**A**	%	**E**	%	**B**	%	**D**	%
D15	R	D12	R	D16	R	D21	R	D33	R
C35	50·0	C46 <	5·0	C17	5·0	C55	5·0	C48 <	5·0
S0		S51		S75		S26		S17	
W70	G	W0	G	W0	G	W0	G	W0	G
P0	0·0	P0	100·0	P0	100·0	P0	100·0	P0	100·0

D	%	**E**	%	**C**	%	**A**	%	**B**	%
D18	R	D2	R	D14	R	D16	R	D16	R
C30	5·0	C14	5·0	C13	50·0	C62	5·0	C62 <	5·0
S44		S81		S1		S19		S16	
W0	G	W1	G	W74	G	W0	G	W0	G
P0	100·0	P0	98·8	P0	1·3	P0	100·0	P0	100·0

B	%	**C**	%	**D**	%	**E**	%	**A**	%
D13	R	D14	R	D8	R	D14	R	D17	R
C20	5·0	C11	50·0	C22	5·0	C30	5·0	C48 <	5·0
S62		S0		S70		S67		S40	
W0	G	W74	G	W0	G	W4	G	W0	G
P0	100·0	P0	0·0	P0	100·0	P0	94·4	P0	100·0

A	%	**D**	%	**B**	%	**C**	%	**E**	%
D22	R	D10	R	D8	R	D7	R	D12	R
C40	5·0	C37	5·0	C22 <	5·0	C20	50·0	C17	10·0
S41		S64		S70		S16		S85	
W0	G	W0	G	W0	G	W64	G	W0	G
P0	100·0	P0	100·0	P0	100·0	P0	20·0	P0	100·0

E	%	**B**	%	**A**	%	**D**	%	**C**	%
D30	R	D12	R	D16	R	D13	R	D13	R
C42	5·0	C28 <	5·0	C43 <	5·0	C17	5·0	C23	40·0
S24		S56		S47		S77		S15	
W0	G	W0	G	W0	G	W0	G	W54	G
P0	100·0	P0	100·0	P0	100·0	P0	100·0	P0	21·7

TRIAL 2.

F*	%
D	R
C	
S	
W	
P	

D	%
D16	R
C4	75·0
S71	
W6	G
P0	92·2

E	%
D13	R
C1	75·0
S54	
W22	G
P6	71·0

B	%
D19	R
C4	85·0
S64	
W7	G
P3	90·1

C	%
D8	R
C4	30·0
S1	
W77	G
P5	1·3

A	%
D13	R
C3	80·0
S75	
W10	G
P3	88·2

B	%
D24	R
C32	50·0
S31	
W2	G
P0	94·0

C	%
D14	R
C1	60·0
S4	
W71	G
P0	5·3

F*	%
D	R
C	
S	
W	
P	

A	%
D13	R
C5	60·0
S62	
W7	G
P1	90·0

D	%
D10	R
C4	90·0
S58	
W12	G
P7	82·9

E	%
D17	R
C3	90·0
S64	
W4	G
P4	94·1

A	%
D29	R
C16	60·0
S57	
W4	G
P0	93·4

F*	%
D	R
C	
S	
W	
P	

D	%
D21	R
C5	90·0
S58	
W4	G
P5	93·5

C	%
D8	R
C5	20·0
S3	
W72	G
P3	4·0

E	%
D9	R
C3	85·0
S54	
W16	G
P4	77·1

B	%
D12	R
C2	85·0
S67	
W4	G
P5	94·4

C	%
D3	R
C6	70·0
S4	
W90	G
P1	4·2

B	%
D10	R
C6	80·0
S64	
W12	G
P4	84·2

A	%
D12	R
C1	60·0
S63	
W12	G
P4	84·0

E	%
D11	R
C1	80·0
S56	
W26	G
P3	68·3

F*	%
D	R
C	
S	
W	
P	

D	%
D13	R
C3	90·0
S66	
W6	G
P2	91·7

D	%
D14	R
C5	75·0
S68	
W9	G
P5	88·3

E	%
D4	R
C5	90·0
S59	
W12	G
P8	83·1

B	%
D13	R
C6	90·0
S75	
W4	
P2	

F*	%
D	R
C	
S	
W	
P	

A	%
D12	R
C2	60·0
S69	
W14	G
P4	83·1

C	%
D12	R
C1	50·0
S1	
W73	G
P4	1·3

E	%
D6	R
C3	90·0
S69	
W20	G
P3	77·5

A	%
D9	R
C2	60·0
S67	
W1	G
P0	98·5

C	%
D5	R
C12	55·0
S20	
W57	G
P0	39·0

D	%
D20	R
C—	90·0
S64	
W4	G
P2	94·1

B	%
D12	R
C5	85·0
S62	
W11	G
P2	84·9

F*	%
D	R
C	
S	
W	
P	

*All eyes dead under F treatment (Trial 2) and no rooting.

TRIAL 3 (Obs.).

G	%
D10	R
C1	65·0
S76	
W13	G
P2	85·4

F	%
D18	R
C1	80·0
S66	
W0	G
P0	100·0

E	%
D15	R
C—	85·0
S73	
W2	G
P0	96·1

D	%
D15	R
C—	90·0
S67	
W4	G
P1	94·4

B	%
D17	R
C—	70·0
S65	
W6	G
P0	91·5

A	%
D16	R
C2	5·0
S60	
W2	G
P2	96·8

TRIAL 4 (Obs.).

A	%
D7	R
C11	Nil
S0	
W3	G
P0	X

B	%
D8	R
C16	Nil
S1	
W1	G
P0	X

C	%
D9	R
C8	5·0
S8	
W7	G
P0	X

D	%
D10	R
C13	5·0
S1	
W6	G
P0	X

E	%
D5	R
C14	5·0
S4	
W2	G
P1	X

F	%
D5	R
C1	50·0
S11	
W11	G
P0	X

A. H. TUCKER, Government Printer, Brisbane.