Ⅱ.

Annex 1.

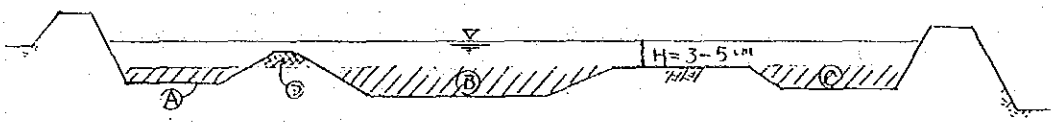
To examine the ineffective water volume in paddy lot.

1. To examine the excess volume of flooding water that occured by uneveness in a lot.

When we think that the suitable water depth of padding and planting is 3 - 5 cm, water level is needed higher 3 - 5 cm than the highest part in the lot.

This condition is shown in Fig-1

(Fig. 1)



When H is the impossible water depth of padding,
Part A, B and C (Fig. ▨) is ineffective water volume.

We have measured value at pilot farm No.1, and calculate the ineffective water volume.

It is shown in Table-1.

Table-1. (Ineffective water volume table).

Lot Number	1836(57)	1835A(1)	1835B(2)	1831(18)	1826B(32)	1826A(33)	1827C(34)	956B(65)	956A(66)	Total	Average
area	2278	815	987	1531	808	943	1227	1037	1165	m^2 10791	
In-effe-tive W.V	104	29	51	69	34	55	30	38	38	448	415 m^3/1000 m^2

(basic : Fig.1 and Table-1).

When we think that this average is the average of this area, total ineffective water volume of all area in P/F No.1 is shown below;

Q = 41.5 X 171,000 m2/1000m2 = 7097 m3.

This ineffective water volume is equivalent the depth of 42 mm.
If ideal water depth is thought 5 cm, 42 mm is its 82 %.
And it is equivalent 3.7 days of designed duty of water (0.022 m3/s) in this area.

For dissolution of this ineffective volume, it is necessary to correct the ground level of the lot by carrying soil from higher part to lower part.

It is difficult that a mass soil is carried at the condition of flooding water. Therefore transportation have to be done at the condition of dry paddy's surface.

When this 9 lots is corrected as Table-2 and Fig-2, ineffective water volume is shown as Table-2.

Table-2 (After correcting ineffective water volume Table).

Lot number	1836(57)	1835A(1)	1835B(2)	1831(18)	1826B(32)	1826A(33)	1827(34)	956B(65)	956A(66)	Total	Average
Area(m2)	2227	815	987	1531	808	943	1227	1037	1165	10971	
Ineffective water volume	32.7	12.5	21.0	24.5	9.4	17.3	13.8	18.0	10.1	159.3	14.8 m3/ 1000 m2
Soil volume of carrying	12	8	15	8	6	5	6	12	8	80	7.4 m3/ 1000 m2

This 14.8 m3/1000m2 is 36 % of before correcting volume (41.5 m3/1000m2).
Total ineffective water volume of all area in P/F No.1 is shown below;

$$Q = 14.8 \times 171{,}000/1000 = 2531 \text{ m3}.$$

This is equivalent 1.3 days (depth 15 mm) of designed duty of water.

Thus soil volumes of 7.4 m3/1000 m2 is carried, then ineffective water volume is decreased 4566 m3 (2.4 days) of water volume.

Table 1－2

PADDY NUMBER << 57 >> B

PART NUMBER	PART HEIGHT(PH)	MAXIMAM HEIGHT(MH)	DIFFERENCE (MH-PH)	PART AREA	UNEFFCT WATER-V
1	6.393	6.393	0.000	233	0
2	6.374	6.393	0.019	255	5
3	6.309	6.393	0.084	255	21
4	6.359	6.393	0.034	255	9
5	6.323	6.393	0.070	255	18
6	6.344	6.393	0.049	255	12
7	6.346	6.393	0.047	255	12
8	6.340	6.393	0.053	255	14
9	6.342	6.393	0.051	260	13
TOTAL	6.347			2278	104

PADDY NUMBER << 1 >> C

PART NUMBER	PART HEIGHT(PH)	MAXIMAM HEIGHT(MH)	DIFFERENCE (MH-PH)	PART AREA	UNEFFCT WATER-V
1	6.356	6.416	0.060	140	8
2	6.366	6.416	0.050	135	7
3	6.374	6.416	0.042	130	5
4	6.384	6.416	0.032	145	5
5	6.416	6.416	0.000	135	0
6	6.385	6.416	0.031	130	4
TOTAL	6.380			815	29

PADDY NUMBER << 2 >> C

PART NUMBER	PART HEIGHT(PH)	MAXIMAM HEIGHT(MH)	DIFFERENCE (MH-PH)	PART AREA	UNEFFCT WATER-V
1	6.296	6.399	0.103	95	10
2	6.264	6.399	0.135	100	13
3	6.306	6.399	0.093	102	9
4	6.323	6.399	0.076	110	8
5	6.389	6.399	0.010	110	1
6	6.367	6.399	0.032	110	4
7	6.399	6.399	0.000	120	0
8	6.389	6.399	0.010	130	1
9	6.367	6.399	0.032	120	4
TOTAL	6.348			987	51

PADDY NUMBER << 18 >> C

PART NUMBER	PART HEIGHT(PH)	MAXIMAM HEIGHT(MH)	DIFFERENCE (MH-PH)	PART AREA	UNEFFCT WATER-V
1	6.474	6.474	0.000	165	0
2	6.457	6.474	0.017	175	3
3	6.443	6.474	0.031	176	5
4	6.406	6.474	0.068	170	12
5	6.400	6.474	0.074	170	13
6	6.375	6.474	0.099	170	17
7	6.435	6.474	0.039	170	7
8	6.444	6.474	0.030	170	5
9	6.424	6.474	0.050	165	8
TOTAL	6.429			1531	69

2-3

Table 1－2

PADDY NUMBER << 32 >> C

PART NUMBER	PART HEIGHT(PH)	MAXIMAM HEIGHT(MH)	DIFFERENCE (MH-PH)	PART AREA	UNEFFCT WATER-V
1	6.246	6.277	0.031	195	6
2	6.277	6.277	0.000	195	0
3	6.208	6.277	0.069	218	15
4	6.212	6.277	0.065	200	13
TOTAL	6.235			808 m^2	34 m^3

PADDY NUMBER << 33 >> C

PART NUMBER	PART HEIGHT(PH)	MAXIMAM HEIGHT(MH)	DIFFERENCE (MH-PH)	PART AREA	UNEFFCT WATER-V
1	6.242	6.350	0.108	157	17
2	6.246	6.350	0.104	150	16
3	6.350	6.350	0.000	160	0
4	6.302	6.350	0.048	157	8
5	6.311	6.350	0.039	164	6
6	6.292	6.350	0.058	155	9
TOTAL	6.291			943 m^2	55 m^3

PADDY NUMBER << 34 >> C

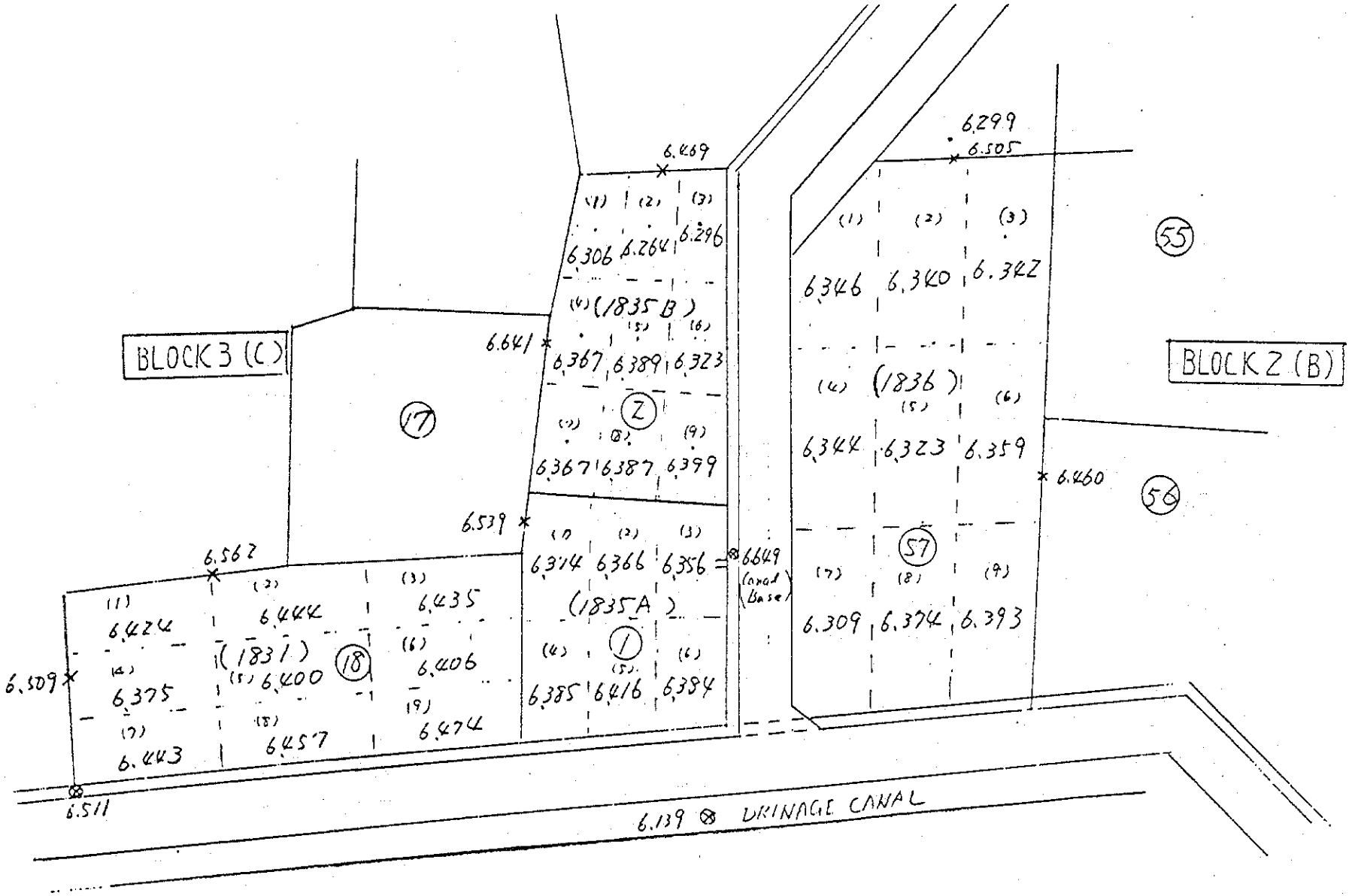
PART NUMBER	PART HEIGHT(PH)	MAXIMAM HEIGHT(MH)	DIFFERENCE (MH-PH)	PART AREA	UNEFFCT WATER-V
1	6.262	6.339	0.077	170	13
2	6.339	6.339	0.000	205	0
3	6.312	6.339	0.027	240	6
4	6.326	6.339	0.013	180	2
5	6.302	6.339	0.037	205	8
6	6.338	6.339	0.001	227	0
TOTAL	6.315			1227 m^2	30 m^3

PADDY NUMBER << 65 >> D

PART NUMBER	PART HEIGHT(PH)	MAXIMAM HEIGHT(MH)	DIFFERENCE (MH-PH)	PART AREA	UNEFFCT WATER-V
1	6.412	6.415	0.003	178	1
2	6.315	6.415	0.100	178	18
3	6.400	6.415	0.015	167	3
4	6.414	6.415	0.001	167	0
5	6.320	6.415	0.095	174	17
6	6.415	6.415	0.000	173	0
TOTAL	6.37Y			1037 m^2	38 m^3

PADDY NUMBER << 66 >> D

PART NUMBER	PART HEIGHT(PH)	MAXIMAM HEIGHT(MH)	DIFFERENCE (MH-PH)	PART AREA	UNEFFCT WATER-V
1	6.386	6.437	0.051	175	9
2	6.404	6.437	0.033	180	6
3	6.437	6.437	0.000	195	0
4	6.385	6.437	0.052	195	10
5	6.427	6.437	0.010	215	2
6	6.382	6.437	0.055	205	11
TOTAL	6.404			1165 m^2	38 m^3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18
55
56
57
Z
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(1831)
(1835 A)
(1835 B)
(1836)
6.641
6.539
6.567
6.509
6.511
6.139
DRINAGE CANAL
6.649
(canal Base)
6.460
6.299
6.505
6.469
6.306
6.264
6.296
6.367
6.389
6.323
6.367
6.387
6.399
6.314
6.366
6.356
6.385
6.416
6.384
6.346
6.340
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6.344
6.323
6.359
6.309
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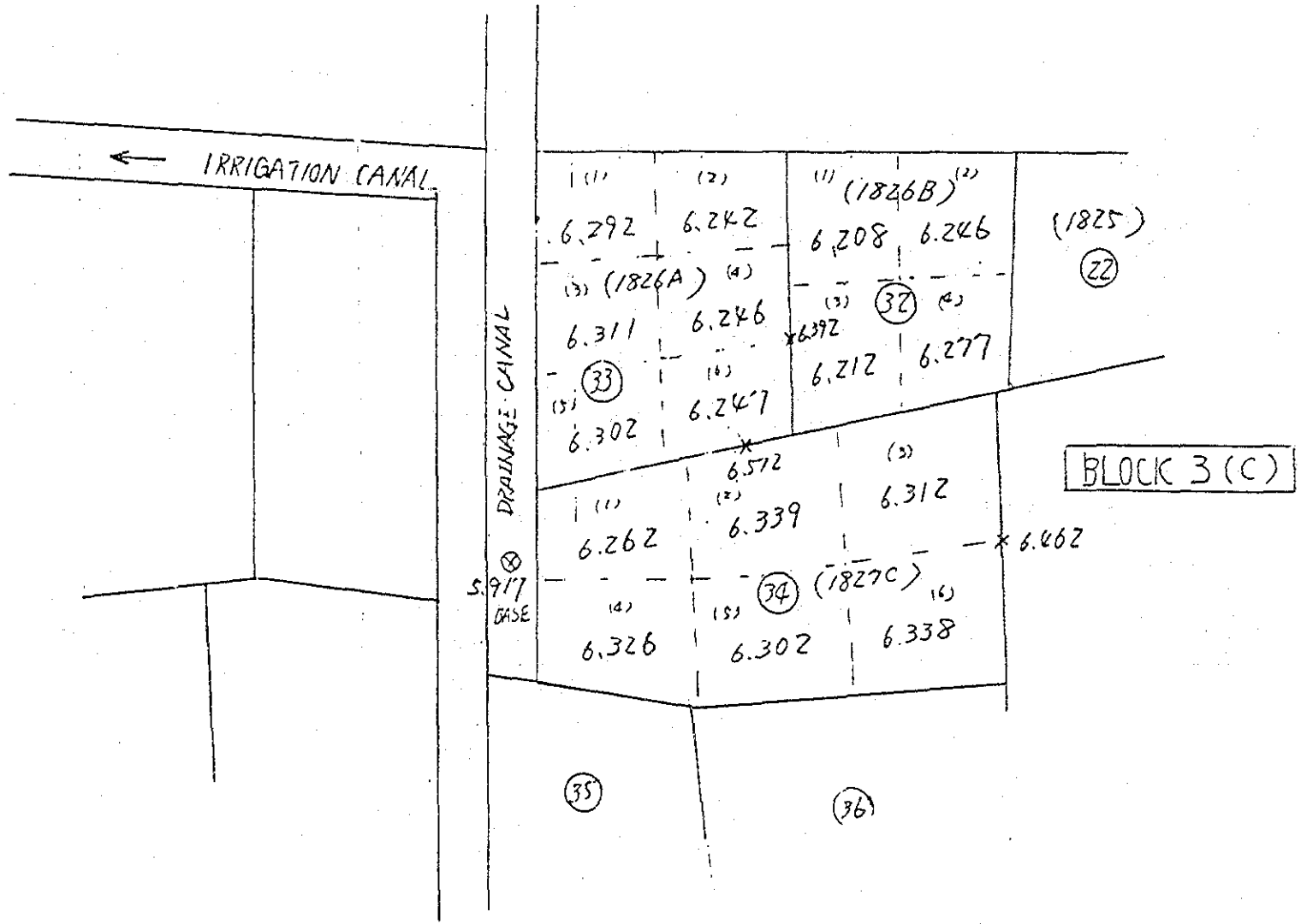
6.406
6.443
6.457
6.474

Fig 1—1


IRRIGATION CANAL
DRAINAGE CANAL
5.917
BASE
(1826A)
(1826B)
(1827C)
(1825)
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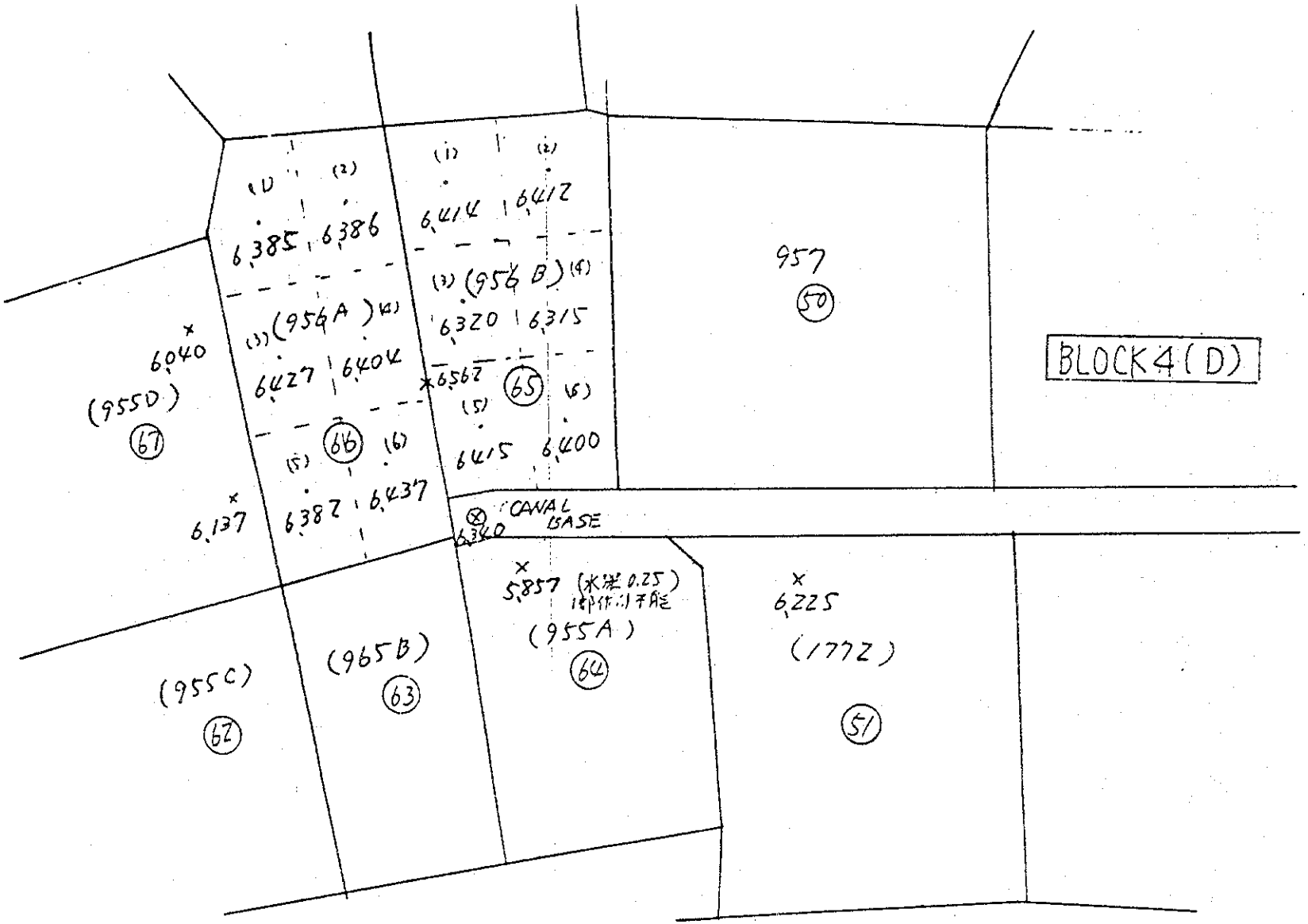
(2) 6.242
(3) 6.311
(4) 6.246
(5) 6.302
(6) 6.247
(1) 6.208
(2) 6.246
(3) 6.212
(4) 6.277
6.392
6.572
(1) 6.262
(2) 6.339
(3) 6.312
6.662
(4) 6.326
(5) 6.302
(6) 6.338
33
32
22
34
35
36

Fig 1—2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(956B)
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66
65
(955C)
62
(965B)
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(955A)
64
(1772)
51
CANAL BASE
6,340
6,385
6,386
6,414
6,412
6,427
6,404
6,387
6,437
6,415
6,400
6,320
6,315
6,562
6,040
6,137
5,857
(水深 0.25)
6,225

Fig 1—3

Table 2－1

PADDY NUMBER << 57 >> B

PART NUMBER	PART HEIGHT	PART AREA	EARTH OUT	EARTH IN	PLAN HEIGHT	MAXIMAM HEIGHT	DIFFEREN CE HEIGHT	UINVALIDITY VOLUME
1	6.346	233	0.0	0.0	6.346	6.362	0.016	3.8
2	6.340	255	0.0	0.0	6.340	6.362	0.022	5.7
3	6.342	255	0.0	0.0	6.342	6.362	0.020	5.2
4	6.344	255	0.0	0.0	6.344	6.362	0.018	4.6
5	6.323	255	0.0	4.0	6.339	6.362	0.024	6.0
6	6.359	255	0.0	0.0	6.359	6.362	0.003	0.8
7	6.309	255	0.0	8.0	6.340	6.362	0.022	5.6
8	6.374	255	4.0	0.0	6.358	6.362	0.004	1.0
9	6.393	260	8.0	0.0	6.362	6.362	0.000	0.0
TOTAL	~~6.348~~	2278	12.0	12.0	6.348			32.7

PADDY NUMBER << 1 >> C

PART NUMBER	PART HEIGHT	PART AREA	EARTH OUT	EARTH IN	PLAN HEIGHT	MAXIMAM HEIGHT	DIFFEREN CE HEIGHT	UINVALIDITY VOLUME
1	6.374	140	0.0	0.0	6.374	6.396	0.022	3.0
2	6.396	135	0.0	4.0	6.396	6.396	0.000	0.0
3	6.356	130	0.0	4.0	6.387	6.396	0.009	1.2
4	6.385	145	0.0	0.0	6.385	6.396	0.011	1.5
5	6.416	135	8.0	0.0	6.357	6.396	0.039	5.3
6	6.384	130	0.0	0.0	6.384	6.396	0.012	1.5
TOTAL	~~6.388~~	815	8.0	8.0	6.388			12.5

PADDY NUMBER << 2 >> C

PART NUMBER	PART HEIGHT	PART AREA	EARTH OUT	EARTH IN	PLAN HEIGHT	MAXIMAM HEIGHT	DIFFEREN CE HEIGHT	UINVALIDITY VOLUME
1	6.306	95	0.0	0.0	6.306	6.368	0.062	5.9
2	6.264	100	0.0	10.0	6.364	6.368	0.004	0.4
3	6.296	102	0.0	0.0	6.296	6.368	0.072	7.4
4	6.367	110	0.0	0.0	6.367	6.368	0.001	0.2
5	6.389	110	5.0	0.0	6.344	6.368	0.025	2.7
6	6.323	110	0.0	5.0	6.368	6.368	0.000	0.0
7	6.367	120	0.0	0.0	6.367	6.368	0.001	0.2
8	6.387	120	5.0	0.0	6.345	6.368	0.023	2.8
9	6.399	120	5.0	0.0	6.357	6.368	0.011	1.3
TOTAL	~~6.347~~	987	15.0	15.0	6.347			21.0

PADDY NUMBER << 18 >> C

PART NUMBER	PART HEIGHT	PART AREA	EARTH OUT	EARTH IN	PLAN HEIGHT	MAXIMAM HEIGHT	DIFFEREN CE HEIGHT	UINVALIDITY VOLUME
1	6.424	165	0.0	0.0	6.424	6.445	0.021	3.4
2	6.444	175	0.0	0.0	6.444	6.445	0.001	0.1
3	6.435	176	0.0	0.0	6.435	6.445	0.010	1.7
4	6.375	170	0.0	3.0	6.393	6.445	0.052	8.8
5	6.400	170	0.0	2.0	6.412	6.445	0.033	5.6
6	6.406	170	0.0	3.0	6.424	6.445	0.021	3.6
7	6.443	170	0.0	0.0	6.443	6.445	0.002	0.3
8	6.457	170	3.0	0.0	6.439	6.445	0.005	0.9
9	6.475	165	5.0	0.0	6.445	6.445	0.000	0.0
TOTAL	~~6.429~~	1531	8.0	8.0	6.429			24.5

Table 2－2

PADDY NUMBER << 65 >> D

PART NUMBER	PART HEIGHT	PART AREA	EARTH OUT	EARTH IN	PLAN HEIGHT	MAXIMAM HEIGHT	DIFFEREN CE HEIGHT	UINVALIDITY VOLUME
1	6.414	178	3.0	0.0	6.397	6.398	0.001	0.1
2	6.412	178	3.0	0.0	6.395	6.398	0.003	0.5
3	6.320	167	0.0	6.0	6.356	6.398	0.042	7.0
4	6.315	167	0.0	6.0	6.351	6.398	0.047	7.8
5	6.415	174	3.0	0.0	6.398	6.398	0.000	0.0
6	6.400	173	3.0	0.0	6.383	6.398	0.015	2.6
TOTAL	~~6.380~~	1037	12.0	12.0	6.380			18.0

PADDY NUMBER << 66 >> D

PART NUMBER	PART HEIGHT	PART AREA	EARTH OUT	EARTH IN	PLAN HEIGHT	MAXIMAM HEIGHT	DIFFEREN CE HEIGHT	UINVALIDITY VOLUME
1	6.385	175	0.0	2.0	6.396	6.413	0.016	2.8
2	6.386	180	0.0	1.0	6.392	6.413	0.021	3.8
3	6.427	195	3.0	0.0	6.412	6.413	0.001	0.2
4	6.404	195	0.0	0.0	6.404	6.413	0.009	1.7
5	6.382	215	0.0	5.0	6.405	6.413	0.007	1.6
6	6.437	205	5.0	0.0	6.413	6.413	0.000	0.0
TOTAL	~~6.404~~	1165	8.0	8.0	6.404			10.1

PADDY NUMBER << 32 >> C

PART NUMBER	PART HEIGHT	PART AREA	EARTH OUT	EARTH IN	PLAN HEIGHT	MAXIMAM HEIGHT	DIFFEREN CE HEIGHT	UINVALIDITY VOLUME
1	6.208	195	0.0	3.0	6.223	6.247	0.024	4.6
2	6.246	195	0.0	0.0	6.246	6.247	0.001	0.2
3	6.212	218	0.0	3.0	6.226	6.247	0.021	4.6
4	6.277	200	6.0	0.0	6.247	6.247	0.000	0.0
TOTAL	~~6.235~~	808	6.0	6.0	6.235			9.4

PADDY NUMBER << 33 >> C

PART NUMBER	PART HEIGHT	PART AREA	EARTH OUT	EARTH IN	PLAN HEIGHT	MAXIMAM HEIGHT	DIFFEREN CE HEIGHT	UINVALIDITY VOLUME
1	6.292	157	0.0	0.0	6.292	6.292	0.000	0.0
2	6.242	150	0.0	0.0	6.242	6.292	0.050	7.5
3	6.311	160	3.0	0.0	6.292	6.292	0.000	0.0
4	6.246	157	0.0	3.0	6.265	6.292	0.027	4.3
5	6.302	164	2.0	0.0	6.290	6.292	0.002	0.4
6	6.247	155	0.0	2.0	6.260	6.292	0.032	5.0
TOTAL	~~6.274~~	943	5.0	5.0	6.274			17.3

PADDY NUMBER << 34 >> C

PART NUMBER	PART HEIGHT	PART AREA	EARTH OUT	EARTH IN	PLAN HEIGHT	MAXIMAM HEIGHT	DIFFEREN CE HEIGHT	UINVALIDITY VOLUME
1	6.262	170	0.0	6.0	6.297	6.326	0.029	4.9
2	6.339	205	3.0	0.0	6.324	6.326	0.002	0.3
3	6.312	240	0.0	0.0	6.312	6.326	0.014	3.4
4	6.326	180	0.0	0.0	6.326	6.326	0.000	0.0
5	6.302	205	0.0	0.0	6.302	6.326	0.024	4.9
6	6.338	227	3.0	0.0	6.325	6.326	0.001	0.3
TOTAL	~~6.315~~	1227	6.0	6.0	6.315			13.8

```
10 ' ****************************                (PROGRAM I)
20 ' *                          *
30 ' *  UNEFFCT FLOODING WATER  *
40 ' *  VOLUM AT PADDY LOT      *
50 ' *         JUN . 1984       *
60 ' *           BY K.KOYAMA    *
70 ' ****************************
80 '
90  INPUT "PADDY NAME = ";PAD$
100  INPUT "PART NUMBER  = ";PNO
105 PRINT
110    DIM PHG(PNO),PAR(PNO),DIH(PNO),UNW(PNO), TP(PNO)
120   I=1
130  WHILE I<=PNO
140    INPUT "PADDY HEIGHT (M) = " ;PHG(I)
150   INPUT "PADDY AREA (M2)  = " ;PAR(I)
160 PRINT
170    IF MHG  < PHG(I) THEN MHG =PHG(I)
180  I=I+1
190 WEND
200 '=================
210 '
220  LPRINT USING "     &                  & &     & &   &";
                        "PADDY NUMBER <<", PAD$ ,")>"
230  LPRINT
240  A$="  PART      PART       MAXIMAM   DIFFERENCE  PART  UNEFFCT
250  B$="  NUMBER   HEIGHT(PH) HEIGHT(MH)  (MH-PH)    AREA  WATER-V
260  LPRINT USING "&
     &";A$
270  LPRINT USING "&
     &";B$
280 '=======================
290 '
300  I=1
310   WHILE I<=PNO
320       DIH(I)=MHG-PHG(I):  UNW(I)=DIH(I)*PAR(I)
330       TA=TA+PAR(I) :       TU=TU+UNW(I)
340       TP(I)=PHG(I)*PAR(I) :  TTP=TTP+TP(I)
350 '
360 '
370    LPRINT USING "   ####   ##.###    ##.###      ##.###       ##### #####
   ";                    I,PHG(I),MHG ,DIH(I) ,PAR(I) ,UNW(I)
380 I=I+1
 90  WEND
 '0  MHG=TTP / TA
  9 LPRINT
    LPRINT USING " &     &  ##.###                                  ##### #####
   "TOT  AL",MHG,TA,TU
    LPRINT:LPRINT:LPRINT:END
```

```
10 ' ****************************          (PROGRAM 1)
20 ' *                          *
30 ' *  UNEFFCT FLOODING WATER  *
40 ' *  VOLUM AT PADDY LOT      *
50 ' *        JUN . 1984        *
60 ' *            BY K.KOYAMA   *
70 ' ****************************
80 '
90   INPUT "PADDY NAME    = ";PAD$
100  INPUT "PART NUMBER   = ";PNO
110   PRINT  :MHG=0
120   DIM GHA(PNO),GHB(PNO),PAR(PNO),DIH(PNO),UNW(PNO),TP(PNO),ERO(PNO),
K    ERI(PNO)
130  I=1
140   WHILE I<=PNO
150     INPUT "PART  HEIGHT   (M)  = " ;GHB(I)
160     INPUT "PART  AREA    (M2)  = " ;PAR(I)
170     INPUT "HAULING OUT OF EARTH (M3) = " ;ERO(I)
180     INPUT "HAURING INTO EARTH   (M3) = " ;ERI(I)
190     PRINT
200   GHA(I)= GHB(I)-(ERO(I)-ERI(I))/PAR(I)
210     IF MHG  < GHB(I) THEN MHG =GHB(I)
220    I=I+1
230   WEND
240 '=================
250 '
260   LPRINT USING "     &                    & &     & &   &";
                        "PADDY NUMBER <<", PAD$ ,">>"
270   LPRINT
280   A$="  PART    PART     PART  EARTH  EARTH  PLAN     MAXIMAM      DIFFEREN
 UINVA   LICITY"
290   B$=" NUMBER  HEIGHT  AREA  OUT     IN     HEIGHT   HEIGHT      CE HEIGHT
   VOL  UME"
300   LPRINT USING "&
                   &";A$
310   LPRINT USING "&
                   &";B$
320 '======================
330 '
340   I=1
350   WHILE I<=PNO
370       UNV(I)=DIH(I)*PAR(I)
380       U=U+UNV(I)
390       A=A+PAR(I)
400       SO=SO+ERO(I)
410       SI=SI+ERI(I)
420      TA=TA+PAR(I)
430      TP(I)=GHB(I)*PAR(I) :  TTP=TTP+TP(I)
440      TPK(I)=GHA(I)*PAR(I) : TTPK=TTPK+TPK(I)
445    IF MAX <GHA(I) THEN MAX=GHA(I)
450    I=I+1
460   WEND
470     MHG=TTP/TA   : MHGK=TTPK/TA
480     I=1
490   WHILE I<=PNO
492      DIH(I)=MAX -GHA(I):  UNW(I)=DIH(I)*PAR(I) :TU=TU+UNW(I)
500     LPRINT USING " ###    ##.###   #####   ###.# ###.#    ##.###    ##.###
##.###     ###.# "; I,GHB(I),PAR(I),ERO(I),ERI(I),GHA(I),MAX   ,DIH(I),UNW(I)
510     I=I+1
520   WEND
530 '
540     LPRINT
550   LPRINT USING " &    & ##.###   #####   ###.# ###.#    ##.###
        ###.# " :"TOTAL",MHG,A,SO,SI,MHGK,TU
560   LPRINT:LPRINT:LPRINT
570 END
```

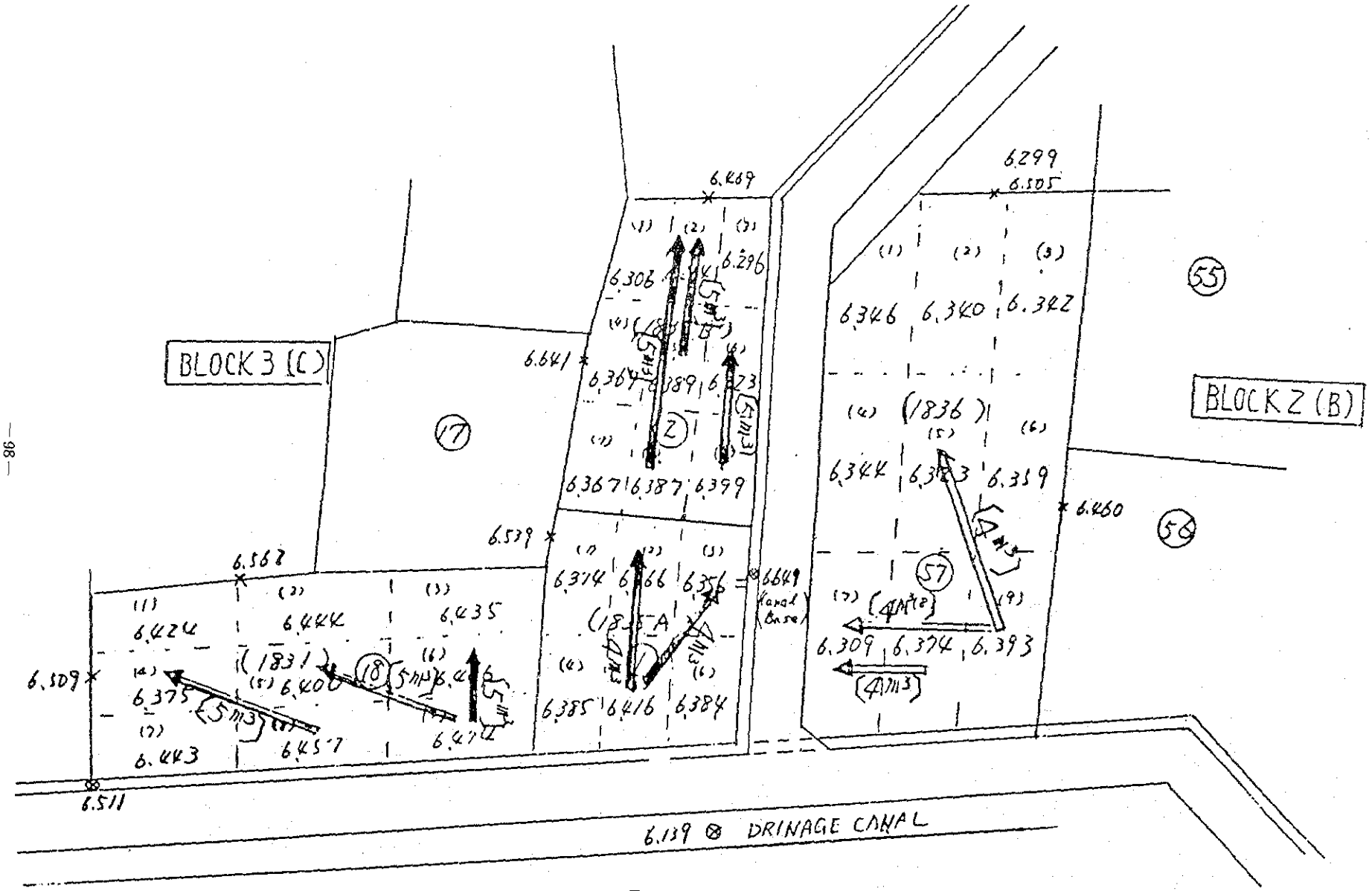

BLOCK 3 (C)
BLOCK 2 (B)
17
18
55
56
57
6.569
6.641
6.539
6.562
6.509
6.511
6.299
6.505
6.460
6.669
Canal Curve
6.139 ⊗ DRINAGE CANAL
(5m/s)
(4m/s)

Fig 2—1

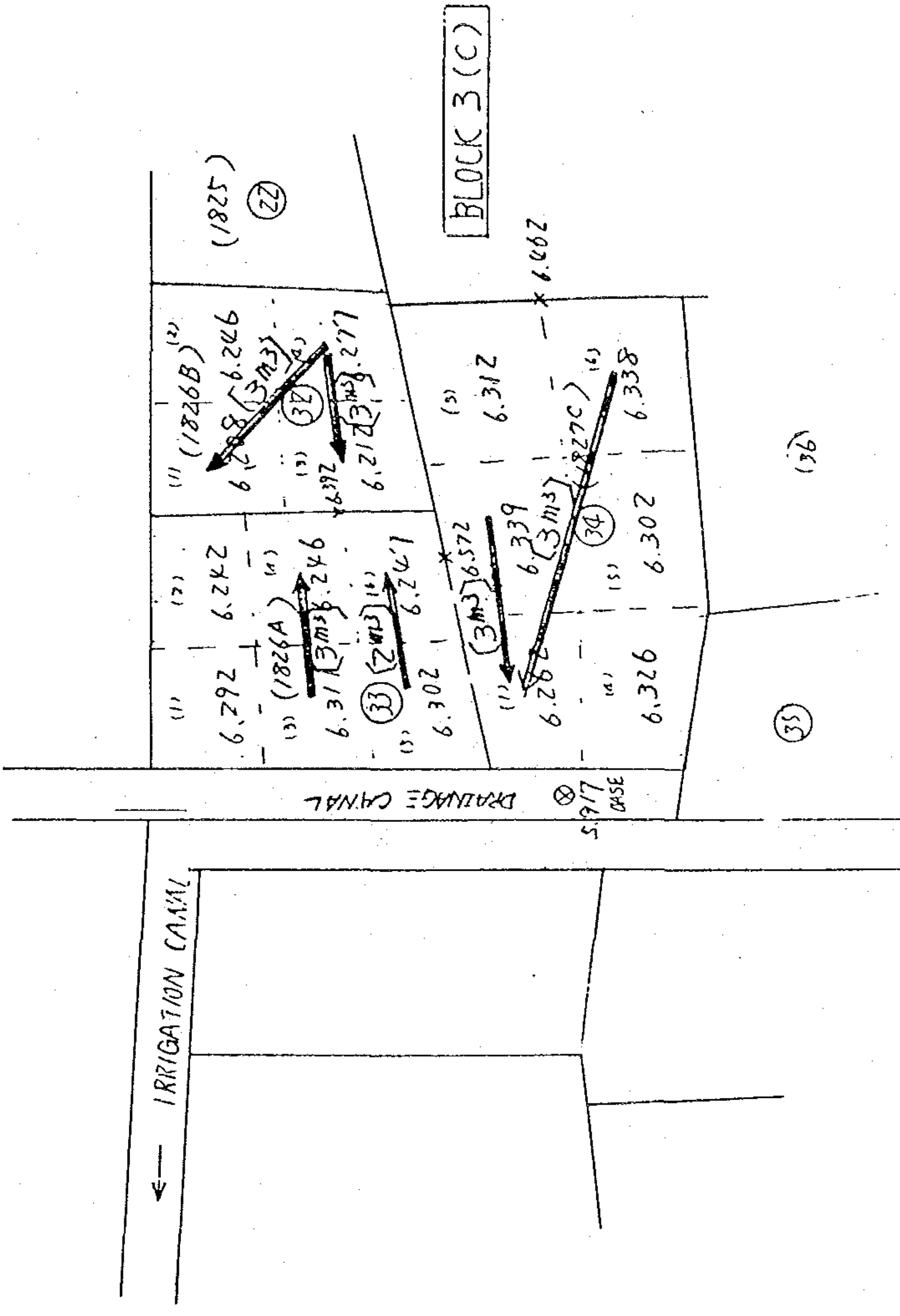

BLOCK 3(C)
(1825)
(22)
(1826B)
(1826A)
(1827C)
32
33
34
35
36
6.402
6.572
6.246
6.277
6.312
6.338
6.302
6.339
6.292
6.242
6.326
6.302
DRAINAGE CANAL
5.917
BASE
IRRIGATION CANAL

Fig 2—2

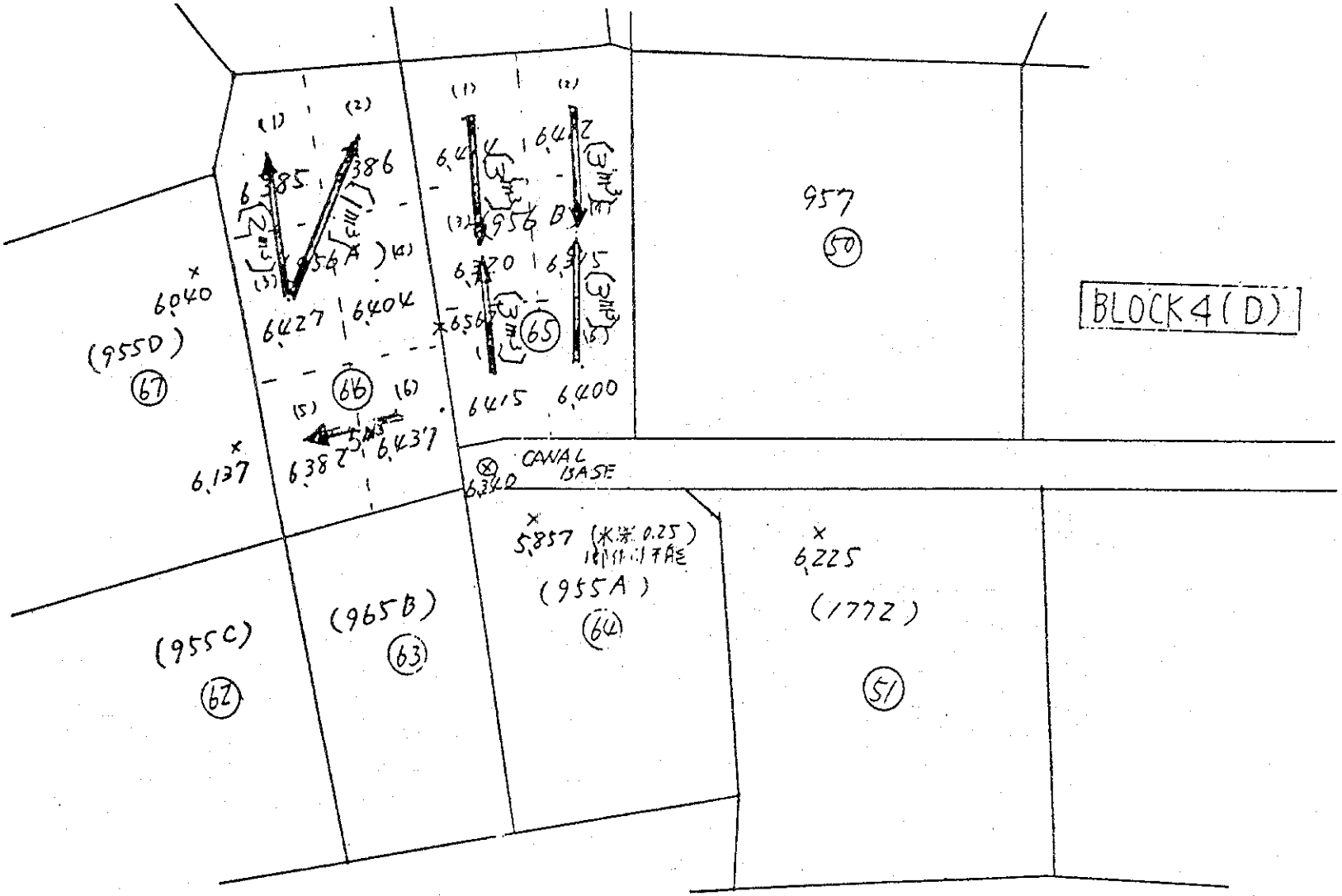
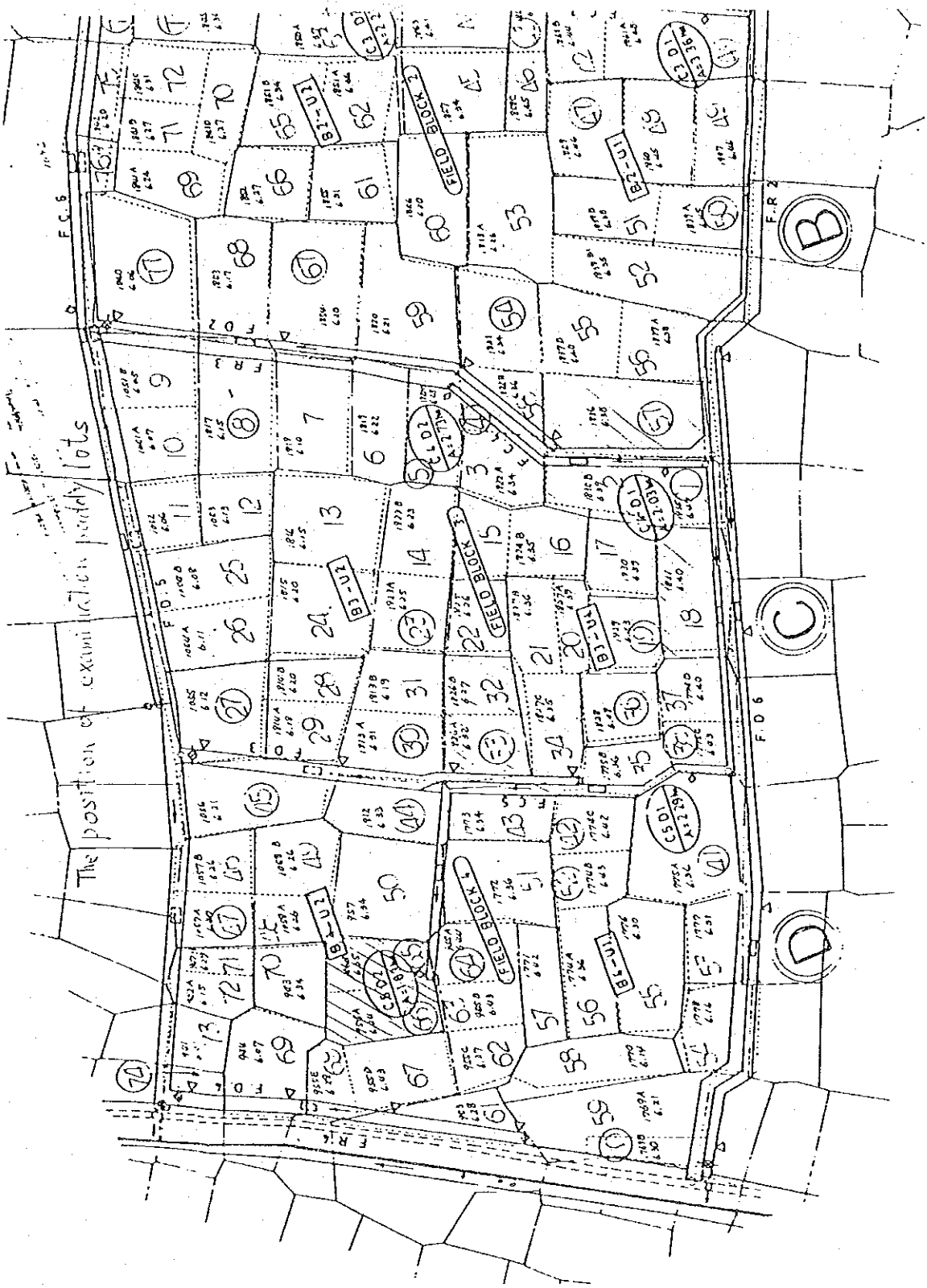

BLOCK 4 (D)
957
50
CANAL BASE
6,340
6,040
(955D)
67
6,137
(955C)
62
(965B)
63
5,857
(955A)
64
6,225
(1772)
51
65
66
6,415
6,400
6,427
6,404
6,382
6,437

Fig 2－3


The position of existing lots
FIELD BLOCK 1
FIELD BLOCK 2
FIELD BLOCK 3
FIELD BLOCK 4
F.D.5
F.D.6
F.R.2
F.R.3
B1-U1
B2-U1
B3-U1
C1-O1
C2-O1
C3-O1
C4-O1
C5-O1
C6-O1
A
B
C
D

Ⅲ.

PROGRAM MANUAL

(Simulation program of lot to lot irrigation)

1. Introducton
2. Hardware used computer
3. Establishment of condition
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   a) Dimention variables
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20th. July 1984.

Koji KOYAMA

1. Introduction.

We made a plan for irrigation system's analysis method by micro computer, its application and the method of using is described below;

This method is developed in order to establish the water management for lot-to-lot irrigation area.
It is possible to examine the following items by using this method.

1. A suitable form and size of irrigation block.
2. A suitable position of in-take, off-take and repeated use of water facilities.
3. Calculation of amount of submerged water and submerged area excess shortage and suitable condition.
4. Calculation of depth of flooding water and the duration of submergence in the lots.

2. Using computer

The personal computer and its units use in this system are shown as below:

(1) Personal computer

TOSHIBA PASOPIA

kind of machine	PA 7010 (made by TOSHIBA Co.)
CPV	Z - 80 A
ROM	32 KB
RAM	64 KB
Machine ward	TOSHIBA T - BASIC
Casette interface	1600 bit/second
Printer interface	Dot printer II 120 character/sec 80 figure
Display interface	8 color
Text mode (screen 0)	80 character X 25 line : 36 character X 24 Line
Graphic mode (screen 1)	160 X 100 dot : 72 X 96 dot
Fan graphic mode (screen 0)	640 X 200 dot : 280 X 192 dot
Source of electricity	50/60 HZ

(2) Green display

Kind of machine	PA 7150 (made by TOSHIBA Co.)
Display part	12 inch mono chrome display
Sources of electricity	AC 100 V 50/60 HZ

(3) Mini floppy disk

Kind of machine	PA 7200 (made by TOSHIBA Co.)
Recording method	Double surface and modefied frequency modulation the diameter 5.25 inch.
Recording capacity	280 KB
Sources of electricity	AC 100 V $\pm$ 10 % 50/60 HZ

(4) Dot printer

Kind of machine	PA 7251 (made by TOSHIBA Co.)
Printing method	dot inpact method
Dot composition	7 X 9 dot
Printing speed	120 character/sec.
Printing character number	80 character/line
Ink ribbon by casette	(X H 0029 p 02)
Sources of electricity	AC 100 V $\pm$ 10 V 50/60 HZ $\pm$ 1 HZ

(5) Data recorder

Kind of machine	PC - DR - 321 (made by NEC)
Circuit way	2 track monoral
Tape speed	4.7 cm/sec
Sources of electricity	AC 100 V 50/60 HZ

3. Establishment of the condition.

The following items are given as input conditions.
Paddy number of the studied block and items for paddy lots are : area, ground height, adjacent paddy number, irrigation requirement, standard water depth, maximum allowable depth, minimum allowable depth, presaturation water depth, inlet number for irrigation water (source paddy lot).
At these condition, it is investigated how water is flooded from the intake to paddy fields in the block.
Using this result following datas were obtained for the paddy lots.

Water depth, water level, amount of submerged water, amount of presaturation water, necessary time of submergence and presaturation, amount of submerged water at standard depth (ideal water volume), difference in volume for standard water depth, excess shortage quantity of water and areas of each condition.

Following condition is established to reappear the state of submerged water.

a. The source is the lot with the highest water level in the paddy lots group.

b. Next paddy of the source paddy can set water intake in the range of maximum water depth of the source paddy number.

c. The water depth of each lots is within the maximum allowable depth.

d. The lots within the minimum allowable depth cannot be flooded

e. If water can flow in and out of the lot, is it possible for the water depth in the lot to be the standard water depth.

f. The paddy that is lower than its surrounding can flood to lowest water level of next paddy.

g. Each paddy can do water-intake to the maximum water level at next paddy.

4. Plan of calculation

(1) To put following data in the program

Paddy number, paddy area, paddy height, next paddy number.

(2) To appoint paddy number for the calculations in the paddy group

(3) To input the following irrigation condition.

Standard water depth, presaturation water depth, maximum allowable water depth, minimum allowable water depth, irrigation requirement.

(4) To input paddy number that become the source of paddy.

(5) To set on trial source of paddy water level as maximum water level of this block.

(6) To decide the water level of each lot.

I) a. To search maximum water level (HWL) in next lot.

b. To decide water level of observed paddy (OPL) by the following case.

HWL > standard water level of observed paddy (SOPL)

OPL = SOPL.

HWL < standard water level of observed paddy (SOPL)

OPL = HWL.

II) a. To search minimum water level (LWL) in next lot.

b. To decide the water level of own paddy (OPL) by the following case.

LWL > water level of own paddy (OPL) OPL = LWL.

If all lot water level doesnot change at these repeating, the following items are given:

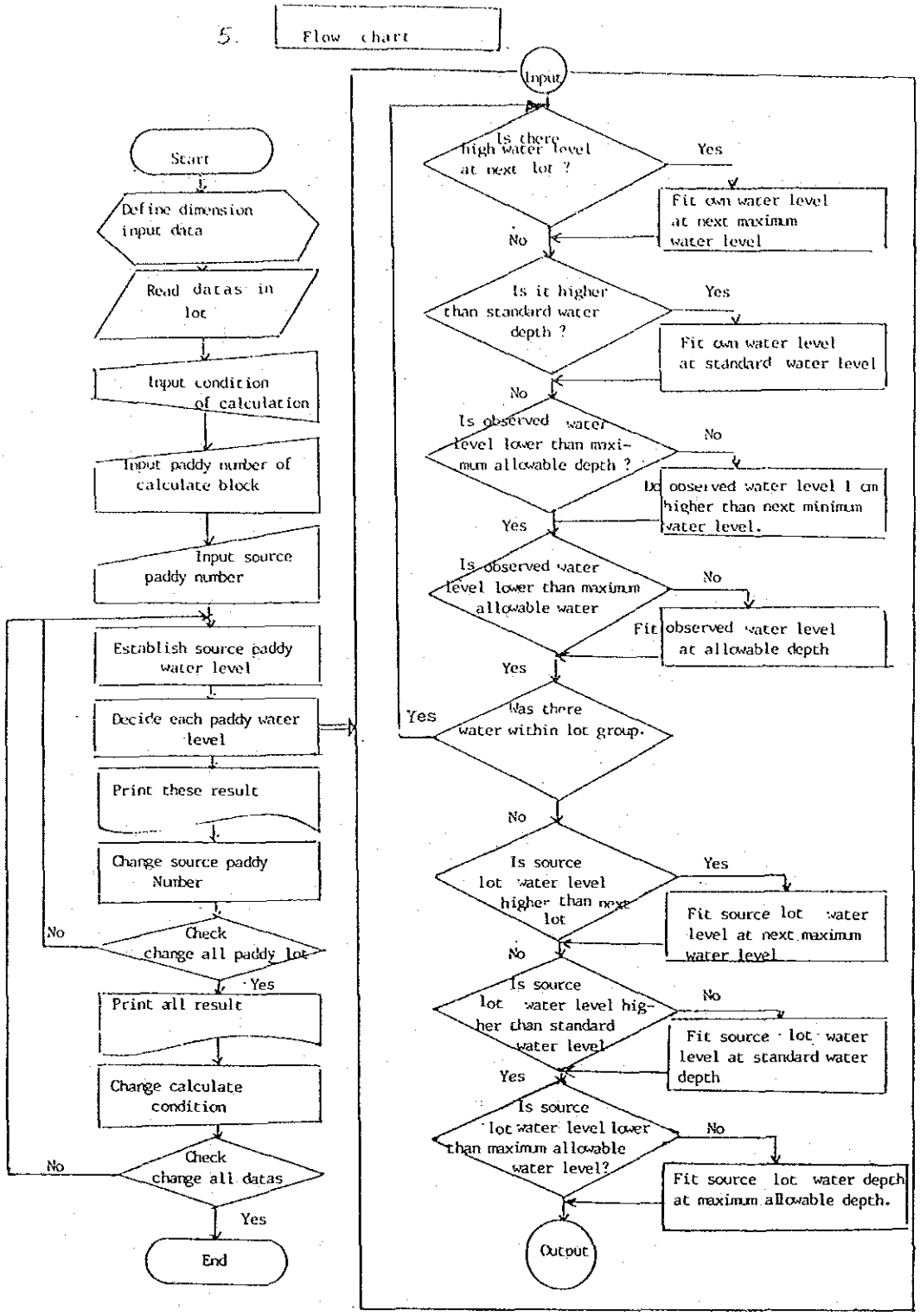
(7) The above results are printed at each paddy lots.

(8) The above total sources of paddy lots are printed on table

(9) The operations of (5) - (8) are repeated by changing condition (3)

(10) When all conditions ended, the computer is stopped.

5. Flow chart


Start
Define dimension input data
Read datas in lot
Input condition of calculation
Input paddy number of calculate block
Input source paddy number
Establish source paddy water level
Decide each paddy water level
Print these result
Change source paddy Number
Check change all paddy lot
No
Yes
Print all result
Change calculate condition
Check change all datas
No
Yes
End
Input
Is there high water level at next lot ?
Yes
Fit own water level at next maximum water level
No
Is it higher than standard water depth ?
Yes
Fit own water level at standard water level
No
Is observed water level lower than maximum allowable depth ?
No
observed water level 1 cm higher than next minimum water level.
Yes
Is observed water level lower than maximum allowable water
No
Fit observed water level at allowable depth
Yes
Was there water within lot group.
Yes
No
Is source lot water level higher than next lot
Yes
Fit source lot water level at next maximum water level
No
Is source lot water level higher than standard water level
No
Fit source lot water level at standard water depth
Yes
Is source lot water level lower than maximum allowable water level?
No
Fit source lot water depth at maximum allowable depth.
Output

6. Explanation of variables

a. Dimension variables.

Name	Dimension number	Explanation	Name	Dimension number	Explanation
			SO	K	Source paddy number (paddy number that have inlet for irrigation water)
PAD	Z + 1	Paddy number in object block of examination.	OK	K	Paddy number of standard water depth
PNO	Z	Paddy number at all data	DE	K	Paddy number of excess water depth
PAR	Z	Lot area (m^2)	SHA	K	Paddy number of shortage water depth(too shallow depth)
PHG	Z	G. L of paddy lot(m)	NO	K	Paddy number cannot be irrigated
NPN 1	Z	Next paddy number (surrounding paddy number)	TWV	K	Amount of submerged water at present state.
			TTM	K	Taking time of submerged water
			DEV	K	Total amount of excess water
NPN 9			SHAV	K	Total amount of shorrage water
NPN 10	Z	When NPN 10 is 1, it shows outlet of underdrain.	NOV	K	Total amount of unirrigated lots
WSH	Z	Water level of paddy lot	TPRV	K	Amount of presaturation water.
MAX P	Z	Maximum water level at next lot	TJV	K	Amount of standard submerged water
MIN P	Z	Minimum water level at next lot	OPA	K	Total area of standard water depth
DEPH	Z	Difference of maximum next water level and observed paddy lot ground level	DPA	K	Total area of excess water depth
			SPA	K	Total area of shortage water depth
DEPV	Z	Difference at amount of submerged water at present state and ideal amount of submerged water	NPA	K	Total area of unirrigated paddy
			W	21	Total depth of paddy lots

Z shows 8079 line
Z is all line number that should be read.

K is that add 2 to numbered of object block.
If K is bigger than 21, K is 20.

b. Simple variables.

Name	Explanation
WAV	Amount of submerged water at paddy lot.
IDV	Ideal amount of submerged water at paddy lot (amount of submerged water at standard depth)
PREV	Amount of presaturation water at paddy lot.
SWD	Standard water depth (m)
PRE	Presaturation water depth (m)
MAD	Maximum allowable depth of flooding water (m)
MID	Minimum allowable depth of flooding water (m)
IRQ	Irrigation requirement (m^3/s)
MAXWLE	Maximum water level at the block
MAXPHG	maximum ground height at the block
DEFM	Water level of paddy lot
TM	Flooding time of paddy lot (min).
TPA	Total area of the block (m^2)
ME $	Variable of memo
S	Area modulus (Nawanobi modulus)
X	Total line number of all data
Y	Paddy number at the block
E	Input number of source paddy + 1
V	Loop number to change input condition
J	Variable to repeat calculation at another condition.

7. Making method of data.

Data is set at end of program by data sentence for easy amendment
Data is made as described below:

1) To affix continuance number from high paddy lot to low paddy paddy lot in the block (Fig. 1).

2) To put the following in the appointed place of the sheet (Fig. 2)

PNO	Paddy number
PAR	Paddy area
PHG	Paddy ground height
NPN 1 ┐	
├	Next paddy number
NPN 10 ┘	

3) The paddy lot can flow to adjacent paddy lots is next paddy
It is not next paddy that is separated by canal and road & etc.

4) If there is outlet of underdrain in the paddy lot, enter 1 in the column of NPN 10.

Input and amendment place of data is described as blow:

Line 8070 Line number of data that is input

8130- 8990 paddy data

When the object block is changed or roads and canals are changed, it is necessary to correct number of next paddy.

9020-9200 Data of calculated condition.

The possible items of change is described as below:

SWD Standard depth of water

PRE Presaturation depth of water

IRQ Water requirement

MAD Maximum allowable depth of flooding water

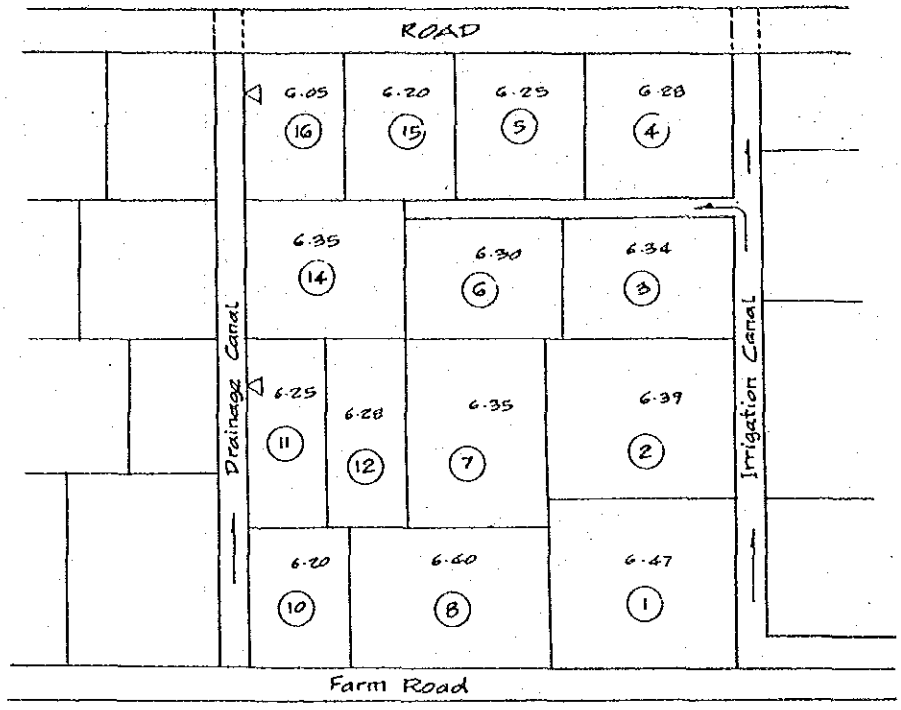
MID Minimum allowable depth of flooding water

Paddy Number	Paddy Area	Paddy Height	NEXT PADDY NUMBER										
PNO	PRA (m^2)	PHG (m)	NP 1	NP 2	NP 3	NP 4	NP 5	NP 6	NP 7	NP 8	NP 9	NP 10	No.
1	980	6.47	2	7	8	0	0	0	0	0	0	0	1861 A
2	1050	6.39	3	7	1	0	0	0	0	0	0	0	1861 B
3	740	6.34	2	6	0	0	0	0	0	0	0	0	1907
4	385	6.28	5	0	0	0	0	0	0	0	0	0	1860
5	467	6.28	4	15	0	0	0	0	0	0	0	0	1959
6	1108	6.30	7	3	0	14	0	0	0	0	0	0	1858
7	1940	6.35	1	2	6	12	8	0	0	0	0	0	1857
8	1530	6.40	1	7	12	10	0	0	0	0	0	0	1820
9	0	6.00	0	0	0	0	0	0	0	0	0	0	1821
10	410	6.20	8	12	11	0	0	0	0	0	0	0	1837
11	488	6.25	10	12	14	0	0	0	0	0	0	1	1836
12	516	6.28	8	7	14	11	10	0	0	0	0	0	1822
13	0	0	0	0	0	0	0	0	0	0	0	0	1854
14	720	6.35	11	12	6	15	0	0	16	0	0	0	1852
15	1235	6.20	5	14	16	0	0	0	0	0	0	0	1851
16	390	6.05	14	15	0	0	0	0	0	0	0	1	1841

Becareful below

- Upper is data of Fig.1
- For irrigation canal that exist between (3) (6) and (4) (5) ; (4) is not next paddy of (3).
- If loss number existed as (9) and (13), it is necessary to enter [N] in a data sheet.
- If paddy has outlet of underdrain as (11) and (16), enter [1] in the column of NPN 10.
  ([1] of paddy (2) does not enter the column of NPN 10.)
- It is possible to enter [0] in the middle of column NPN.

Fig. 1


ROAD
6.05
16
6.20
15
6.25
5
6.28
4
6.35
14
6.30
6
6.34
3
6.25
11
6.28
12
6.35
7
6.39
2
6.20
10
6.60
8
6.47
1
Drainage Canal
Irrigation Canal
Farm Road

8. Using method of program

We can select an optionally small group in the paddy group, and examine its condition of flooding water.

Calculation method is described below.

(1) Push the 'RUN' key, program is started.

(2) Name of the small group is entered. (The name have to be within 6 character)

(3) Input the number of small group. When it is fininshed, input [1999].

(4) Input the standard depth of water.

(5) Input the maximum allowable depth of flooding water.

(6) Input the minimum allowable depth of flooding water

(7) Input the water requirement

(8) Decide the source paddy and input its number, When it is finished, input [1999].

(9) Calculation is started and after 2 or 3 minute, data is printed out.

(10) When calculation is finished, goes the buzer and the next sentence is appeared at the display.

'' DO YOU CONTINUE AT THE SAME BLOCK ? YES = 1 NO = 0 ''

(11) When you want to finish, push [0], to continue [1]
When next error appeared, examine the following.

1) PO error ... [Printer off line] Printer is not conditioned for print out.

2) OM error ... [out of memory] for too many calculcation, memory is lack.

When this case, (a) Decrease number of source paddy.

(b) Decreases number of data at the big block.

3) BS error ... [subscript out of range] Dimension number is out of range

When this is the case, check the following.

(a) Too many number of source paddy. (to be below 20 lot)

(b) Are the following established ?
Data number of line 8070 $\leqq$ number of data line (8130 - 8990)

(c) Are there loss number at [PNO] (line 8130~)
It is necessary to continue at [PNO].

(d) Are there number source paddy that does not exist at datas.

4) SN error ... [Syntax error] Mistake in the grammer of BASIC

Did you change other parts in correcting data by mistake.
(Becareful , .)

5) OD error ... [Out of DATA] Data that is read by READ command does not exist in datas.
Are the following established ?
Number of line (8070) $\leqq$ Number of line [8130 -] (PNO).

6) UL error ... [Undefined line number] Branch line number that is appointed by GOTTO, GOSUB or IF THEN ELSE commands does not exists.
Did you change or erase the line number.

This program is used as AREA MODULUS at line [225] to correct NAWANOBI. If it is necessary correct the program below:

Line 225 S = 1 (AREA MODULUS)

9. Operation method of personal computer.

(1) Switch on the electricity of the transformer.

(2) Switch on the electricity of the green display.

(3) Switch on the electricity of the data recorder.

(4) Switch on the electricitv of the main body of computer.

(5) Input method of the program.

1) Push the RETURN key.

2) Input WIDTH, 80 from key board, push RETURN key.

3) Push the CAPS LOCK key, capital letters are settled.

4) Put in the program cassete at the data recorder, push the LOAD key.

5) Input CLOAD ''PADDY 3'' by the key board, push the RETURN key.
(its started to rotate the data recorder)

6) The green display shows FOUND''PADDY 3''

7) After 7 minutes, display shows OK, and data recorder is stopped.

8) Push the STOP key of the data recorder.

When load missing occured halfway (display shows TAPE ERROR or BAD), move the volume key of LOAD LEVEL, and repeat the same operation.

9) Push the RUN key, computer enters waiting condition of inputing data.

10) Input datas.

:0. Recording method of the program.

1) Turn the new cassete tape by hand, and show the recording part

2) Set the cassete tape at the data recorder, and push the SAVE key and the LOAD key at the same time.

3) Input (SAVE '' Program name '' and push RETURN key.
(Program name have to be within 6 character)

4) Turning flashlight on and off cursor is stopped, and it is started to rotate the data recorder.

5) When recording is finished, display shows OK, and data recorder is stopped.

6) Push the STOP key of data recorder.

11. Correcting method of program.

1) Push the SHIFT key and the CLS key at the same time, then display is cleared.

2) Push the LIST key and the RETURN key, then program is shown at the display.

3) Push the (STOP) key at necessary part of the program.

(When you need halfway, push the following.)
(LIST 800 - 1250 or LIST 900 -)

4) Push the [↑] [↓] [←] [→] key then cursor is moved to the correcting part.

5) Correct the part and push the RETURN key, then correction is finished.

12. Program and Explanation

```
10 ' FILE NAME = "PADDY1"    < BLOCK 1:2 >
20 ' ****************************************
30 ' *                                      *
40 ' *  PADDY BROCK WATER MANAGEMENT METHOD  *
50 ' *               MAY . 1984             *
60 ' *                        BY K.KOYAMA   *
70 ' ****************************************
80 '
100 '============================
110 '--- DIMENSION OF VARIABLE ---
120 '
130  READ X
140  Z = X+1
150   DIM PAD(Z+1),PNO(Z),PAR(Z),PHG(Z)
160   DIM NPN1(Z),NPN2(Z),NPN3(Z),NPN4(Z),NPN5(Z)
170   DIM NPN6(Z),NPN7(Z),NPN8(Z),NPN9(Z),NPN10(Z)
180   DIM WSH(Z),MAXP(Z),MINP(Z) ,DEFH(Z),DEFV(Z)
190 '
200 '============================
210 '--- READ ALL PADDY DATA ---
220 '
225  S=17.13/16.15  '< AREA MODULUS >
230  FOR N=1  TO X
240   READ PNO(N), PAR(N), PHG(N)
245  PAR(N)=PAR(N)*S
250   READ NPN1(N),NPN2(N),NPN3(N),NPN4(N),NPN5(N)
260   READ NPN6(N),NPN7(N),NPN8(N),NPN9(N),NPN10(N)
270  NEXT N
280 '
300 '================================
310 '--- PADDY NUMBER AT THE BLOCK ---
320 '
330  PRINT:PRINT
340  INPUT "PADDY BLOCK NAME  = ";PBNAME$ :PRINT
345  PRINT "INPUT PADDY NUMBER ( END = 999 )"
350   I=1
360    INPUT "   No  = ";PAD(I) :Y=I-1:K=I+1
370      IF PAD(I) = 999  THEN GOTO 384
380   I=I+1 :GOTO 360
384  IF K>21 THEN K=21
385  DIM SO(K),OK(K),DE(K),SHA(K),NO(K),TWV(K),TTM(K),DEV(K),SHAV(K),NOV(K),
    TPRV(K),TIV(K),W(21),OPA(K),NPA(K),DPA(K),SPA(K)
390 '
```

X is the data number from line 8000-8900

Read all the data from 8000-8900 in the variable.

S is area modulus (usually s 1).

Input paddy number of calculation block.

Input the paddy's number when it was finished, input 999

Define the dimension of variable

```
400 '================================
410 '--- PRINT BLOCK PADDY DATA ---                    paddy's data of calculate block is printed.
420 '
430 I=1 :LPRINT
440  LPRINT USING "           &                              &  &     && &"
              ;"=== PADDY DATA ===   BLOCK NAME <<", FBNAME$ ,">>"
450  LPRINT                                                          Title is printed
460  LPRINT "   PNO   PAR   PHG";
470  LPRINT "   NPN1 NPN2 NPN3 NPN4 NPN5 NPN6 NPN7 NPN8 NPN9 NPN10 "
480 '
490 IF PAD(I)=999 THEN GOTO 730
495  P=PAD(I)
500   LPRINT USING "#####";  PNO(P);                    Paddy's datas is printed.
510   LPRINT USING "########";PAR(P);
520   LPRINT USING "###.##"; PHG(P);
530   LPRINT USING "#####"; NPN1(P);
540   LPRINT USING "#####"; NPN2(P);
550   LPRINT USING "#####"; NPN3(P);
560   LPRINT USING "#####"; NPN4(P);
570   LPRINT USING "#####"; NPN5(P);
580   LPRINT USING "#####"; NPN6(P);
590   LPRINT USING "#####"; NPN7(P);
600   LPRINT USING "#####"; NPN8(P);
610   LPRINT USING "#####"; NPN9(P);
620   LPRINT USING "#####"; NPN10(P)
630  I=I+1: GOTO 490
640 '
700 '================================
710 '--- SEASONAL WATER DEPTH (SWD)---                 The condition of irrigation is established.
720 '
730  PRINT:LPRINT:LPRINT
740   INPUT "SEASONAL WATER DEPTH   (M) = "; SWD
745   INPUT "PRESATURATION  DEPTH   (M) = "; PRE
750   INPUT "MAXIMAM ALLOWABLE DEPTH(M) = "; MAD
760   INPUT "MINIMAM ALLOWABLE DEPTH(M) = "; MID
765   INPUT "IRRIGATION QUANTITY (M3/S) = ";IRQ
766  IF IRQ=999 THEN 740
770 ' MID=.05  :IRQ=.022
780   U=0
790 '
```

```
800 '============================
810 '--- SOURCE PADDY NUMBER ---
820 '
830  E=1 :PRINT
835   PRINT "INPUT SOURCE PADDY NUMBER  ( END =999 )"
840    INPUT "    No = "; SO(E)
850    IF SO(E)=999 THEN 930
860  E=E+1 :GOTO 840
870 '
```

The number of source paddy is input.

When it is end, input 999

```
900 '==================================
910 '--- CHANGE SOURCE PADDY NUMBER ---
920 '
930  .E=1
940    IF SO(E)=999 THEN 2720 '< FROM 2680 >
960 '
1000 '========================
1010 '--- WATER LEVEL (WSH)---
1020 '
1030   FOR I=1 TO Z
1040     WSH(I) = 0
1050   NEXT I
1060 '
1200 '================================
1210 '--- MAX WATER LEVEL (MAXWLE)---
1220 '
1230  I=1  : MAXPHG=0
1240    IF PAD(I)=999 THEN 1330
1250    IF MAXPHG < PHG(PAD(I)) THEN MAXPHG=PHG(PAD(I))
1260      MAXWLE = MAXPHG + SWD
1270  I=I+1 :GOTO 1240
1280 '
1300 '================================
1310 '--- SOURCE PADDY WATER LEVEL ---
1320 '
1330    WSH(SO(E))=MAXWLE-PHG(SO(E))
1350  IF WSH(SO(E)) > MAD THEN WSH(SO(E))=MAD
1360 '
```

The number of paddy that has inlet for irrigation water is changed.

The water level of all paddy is set to 0.

The maximum height of paddy is searched at the calculate block.

The water level of source paddy is decided.

```
1400 '============================
1410 '--- WATER LEVEL DECISION ---
1420 '
1430  FOR A=1 TO 2
1450   I=1
1460    IF PAD(I)=999 GOTO 1500
1470      GOSUB 3030
1480   I=I+1:GOTO 1460
1500   I=Y
1510    IF PAD(I)=0   GOTO 1540
1520      GOSUB 3030
1530   I=I-1 :GOTO 1510
1540  NEXT A
1550   FOR J=0 TO 21
1560     W(J)=0
1570   NEXT J
1580    J=1: GOSUB 4030
1590 '
1600 '==================================
1610 '--- CHECK SOURCE PADDY HEIGHT ---
1620 '
1630  I=0 : PAD(I)=SO(E)
1640  GOSUB 3030
1650   IF DEFH(I)<SWD THEN DEFH(I)=SWD
1660    WSH(SO(E))=DEFH(I): PAD(I)=0
1670 '
```

Water level of paddy lots is decided.

Water level of lots is decided in order of inputing at line 360.

Water level of lots is decided in the reverse order inputing at line 360.

The water level that has inlet for irrigation water is checked.

The water level of source paddy is corrected in a suitable height.

```
2000 ' ================================
2010 ' --- CALCULATE RESULT PRINT ---
2020 '
2030  LPRINT :LPRINT
2040    LPRINT USING "       &                                                    &   &
    && &";"   === CALCULATION TABLE ===  BLOCK NAME << ", PBNAME$ ,">>"
2050    LPRINT
2060   A$=" NUM  AREA HEI  WATER  WATER  MEMO  WATER  PRESATURA IRRIGATION IDEAL
 DIFFE  "
2070   B$=" BER       GHT  DEPTH  LEVEL        VOLUME TION W-V     TIME    W-V
 RENCE-V  "
2080   LPRINT USING "&
                  &"; A$
2090   LPRINT USING "&
                  &"; B$
2100 '----------------------
2210  I=1    :TPA=0:TWV(E)=0:TPRV(E)=0:TTM(E)=0:OK(E)=0:DE(E)=0:SHA(E)=0:NO(E)=0:
     TIV(E)=0:DEV(E)=0:SHAV(E)=0:NOV(E)=0:OPA(E)=0:DPA(E)=0:SPA(E)=0:NPA(E)=0
2220  P=PAD(I)
2225  IF P=999 THEN 2500
2230   DEFM   = WSH(P)+ PHG(P)
2240  IF WSH(P)< MID-.005 THEN C=0 ELSE C=1
2250   WAV    = PAR(P)* WSH(P) * C
2255   PREV   = PAR(P)* PRE * C
2260   IDV    = PAR(P)* ( SWD + PRE )
2270   DEFV(P)= WAV   + PREV - IDV
2275   TM     = (WAV+PREV)/(IRQ * 60)
2280   TPA    = TPA   + PAR(P)
2282   TWV(E) = TWV(E)+ WAV
2284   TPRV(E)= TPRV(E)+ PREV
2286   TTM(E) = TTM(E)+ TM
2288   TIV(E) = TIV(E)+ IDV
```

The result of calculation is printed for the table.

```
2296 '--------------------
2300   LPRINT USING "###";      PNO(P); '< PADDY NUMBER >
2310   LPRINT USING "#######";  PAR(P); '< PADDY AREA   >
2320   LPRINT USING "###.##";   PHG(P); '< PADDY HEIGHT >
2330   LPRINT USING "###.##";   WSH(P); '< WATER DEPTH  >
2340   LPRINT USING "####.##"; DEFM  ; '< WATER LEVEL  >
2350  GOSUB 5030
2360   LPRINT USING "  &   &"; ME$   ; '< MEMO         >
2370   LPRINT USING "#####.#"; WAV   ; '< WATER VOLUME >
2380   LPRINT USING "  #####.#"; PREV; '< PRESATURATION VOLUME>
2390   LPRINT USING "    #####"; TM  ; '< IRRIGATION TIME   >
2400   LPRINT USING "  #####.#"; IDV ; '< IDEAL WATER VOLUME>
2410   LPRINT USING " #####.#"; DEFV(P)'< DIFFERENCE VOLUME >
2420  I=I+1:GOTO 2220
```

The above calculation is printed.


```
2500 '--------------------
2510   LPRINT USING "&
          &";"TOTAL (M2)                                    (M3)      (M3)     (min)
 (M3)"
2520   LPRINT USING "###"; Y ;
2530   LPRINT USING " #####  ";TPA ;
2540   LPRINT USING " &                          &";"";
2550   LPRINT USING "######.#";TWV(E);
2560   LPRINT USING " ######.#";TPRV(E);
2570   LPRINT USING "   ######"; TTM(E);
2580   LPRINT USING " ######.#"; TIV(E)
```

The total of above result is printed.

```
2590 '----------------------
2600  LPRINT:LPRINT
2610  LPRINT USING "&                                  &###  &    &";"SOURCE PADDY NUMB
ER      = [",SO(E),"] "
2615   PRINT USING "&                                  &###  &    &";"SOURCE PADDY NUMB
ER      = [",SO(E),"] "
2620  LPRINT USING "&                                &  #.##  ";"SEASONAL WATER DEPTH (
M) =",SWD
2625  LPRINT USING "&                                &  #.## ";"PRESATURATION  DEPTH (M
) =",PRE
2630  LPRINT USING "&                                &  #.##          &
            & ";"MAXIMAM ALLOWABLE DEPTH  =",MAD,"DIFFERENCE   TOTAL  PRECENTAG
E"
2635  LPRINT USING "&                                &  #.##          &
         &  ";"MINIMAM ALLOWABLE DEPTH  =",MID,"V-TOTAL(M3) ARIA(M2)   (%)
   ":LPRINT
```



```
2640  LPRINT USING "&                                    &####                    ######
     ###.#"; "STANDARD WATER DEPTH NUMBER =",OK(E),OPA(E),OPA(E)/TPA*100
2650  LPRINT USING "&                                    &#### &     &#####.#     ######
     ###.#"; "TOO DEEP  PADDY    NUMBER  =",DE(E),"------ ",DEV(E),DPA(E),DPA(E
)/TPA*100
2660  LPRINT USING "&                                    &#### &     &#####.#     ######
     ###.#"; "TOO SHALLOW  PADDY  NUMBER  =",SHA(E),"------ ",SHAV(E),SPA(E),SPA
(E)/TPA*100
2665  LPRINT USING "&                                    &#### &     &#####.#     ######
     ###.#"; "IMPOSSIBLE IRRIGATION NUMBER=",NO(E),"------",NOV(E),NPA(E),NPA(E)
/TPA*100:LPRINT
2666  LPRINT USING "&                                  & ##.### ";"IRRIGATION QUANTITY
 (M3/S) =",IRQ
2670    LPRINT:LPRINT:LPRINT
2680  E=E+1  :GOTO 940
2690 '
```

```
2700 '============================
2710 '--- ALL RESULT TABLE ---                                    All the result is printed for the table.
2720 '
2730  LPRINT:LPRINT
2740    LPRINT USING "       &                                          &   &
    && &";"    === ALL RESULT TABLE ===    BLOCK NAME << ", PBNAME$ ,">>"_          The title is printed.
2750    LPRINT
2760   A$="SOURCE STAN TOO  SHA  IMPOS  WATER  IRRIGATION IDEAL      DIFFERENCE-
U  "
2770   B$="NUMBER DARD DEEP LLOW SIBLE  VOLUME  TIME(min) VOLUME    OVER    LACK
   NO"
2780   LPRINT USING "&
             &"; A$
2790   LPRINT USING "&
               &"; B$
2800  E=1
2810   IF SO(E) = 999 THEN 2840


                                                          Total of items at source paddy is printed.
2815  TWTP=TWV(E)+TPRV(E)
2820  LPRINT USING "####  #### #### #### ####   ######.#   #####   ######.# #####.
# ######.# #######.#";SO(E),OK(E),DE(E),SHA(E),NO(E),TWTP,TTM(E),TIV(E),DEV(E),SHA
V(E),NOV(E)
2830  E=E+1 : GOTO 2810
2840   LPRINT:LPRINT
2850   LPRINT USING "  &                          &  ###### ";"TOTAL  AREA
       (M2) =",TPA
2852   LPRINT USING "  &                          &  ###.## ";"SEASONAL  WATER
 DEPTH  (M) =",SWD
2853   LPRINT USING "  &                          &  ###.## ";"PRESATURATION
 DEPTH  (M) =",PRE
2854   LPRINT USING "  &                          &  ###.## ";"MAXIMAM ALLOWABL
E DEPTH (M) =",MAD
2855   LPRINT USING "  &                          &  ###.## ";"MINIMAM ALLOWABL
E DEPTH (M) =",MID
2856   LPRINT USING "  &                          &  ###.###";"IRRIGATION QUANT
ITY  (M3/S) =",IRQ
2857   LPRINT:LPRINT:LPRINT:LPRINT
                                                          The condition of irrigation is printed.
```

```
2858  U=U+1
2860  ON U GOTO 9020,9030,9040,9050,9060,9070,9080,9090,9100,9110,9120,9130,9140
2861 '----------
2862 FOR I=1 TO 6
2863  SOUND 0,300
2864 NEXT I
2870 FOR I=1 TO 20
2875  SOUND 58,30
2880  SOUND 0,20
2885 NEXT I
2890 '
```

The calculation is ended, then goes the buzzer.

The condition of irrigation is changed of in the line 9020-9140, and calculation is repeated.


```
2900 '=====================
2910  PRINT
2920   INPUT "DO YOU CONTINUE AT THE SAME BLOCK ?  YES = 1    NO = 0 "; CON
2930    IF CON = 0   THEN 330  ELSE 730
2940  END
2990 '
```

```
2858  U=U+1
2860  ON U GOTO 9020,9030,9040,9050,9060,9070,9080,9090,9100,9110,9120,9130,9140
2861 '----------
2862 FOR I=1 TO 6
2863  SOUND 0,300
2864 NEXT I
2870 FOR I=1 TO 20
2875  SOUND 58,30
2880  SOUND 0,20
2885 NEXT I
2890 '
```

The condition of irrigation is changed of in the line 9020-9140, and calculation is repeated.

The calculation is ended, then goes the buzzer.

```
2900 '=====================
2910  PRINT
2920   INPUT "DO YOU CONTINUE AT THE SAME BLOCK ?  YES = 1   NO = 0 "; CON
2930    IF CON = 0   THEN 330  ELSE 730
2940  END
2990 '
```

```
3000 '================================================
3010 '-- SUBRUTINE < MAXIMUM HEIGHT PADDY RESEARCH > --
3020 '
3030  MAXP(I)=PHG(PAD(I))
3035  N=NPN1(PAD(I))
3040  IF N=0  OR  WSH(N)=0 THEN 3050
3045    W1=WSH(N)+PHG(N)
3046    IF MAXP(I)<W1 THEN MAXP(I)=W1
3050  N=NPN2(PAD(I))
3055  IF N=0  OR  WSH(N)=0 THEN 3080
3060    W2=WSH(N)+PHG(N)
3070    IF MAXP(I)<W2 THEN MAXP(I)=W2
3080  N=NPN3(PAD(I))
3085  IF N=0  OR  WSH(N)=0 THEN 3110
3090    W3=WSH(N)+PHG(N)
3100    IF MAXP(I)<W3 THEN MAXP(I)=W3
3110  N=NPN4(PAD(I))
3115  IF N=0  OR  WSH(N)=0 THEN 3140
3120    W4=WSH(N)+PHG(N)
3130    IF MAXP(I)<W4 THEN MAXP(I)=W4
3140  N=NPN5(PAD(I))
3145  IF N=0  OR  WSH(N)=0 THEN 3170
3150    W5=WSH(N)+PHG(N)
3160    IF MAXP(I)<W5 THEN MAXP(I)=W5
3170  N=NPN6(PAD(I))
3175  IF N=0  OR  WSH(N)=0 THEN 3200
3180    W6=WSH(N)+PHG(N)
3190    IF MAXP(I)<W6 THEN MAXP(I)=W6
3200  N=NPN7(PAD(I))
3205  IF N=0  OR  WSH(N)=0 THEN 3230
3210    W7=WSH(N)+PHG(N)
3220    IF MAXP(I)<W7 THEN MAXP(I)=W7
```

The maximum water level os paddy is searched.

The of paddy of heighest water is searched in the next paddy (neighbours paddy) of the object paddy, and the water level of object is decided.

a) If N is 0, then there is no next paddy

b) If WSH (N) is 0, there is no flooding on the next paddy.

```
3230  N=NPN8(PAD(I))
3235  IF N=0  OR  WSH(N)=0 THEN 3260
3240    W8=WSH(N)+PHG(N)
3250    IF MAXP(I)<W8 THEN MAXP(I)=W8
3260  N=NPN9(PAD(I))
3265  IF N=0  OR  WSH(N)=0 THEN 3290
3270    W9=WSH(N)+PHG(N)
3280    IF MAXP(I)<W9 THEN MAXP(I)=W9
3290  N=NPN10(PAD(I))
3295  IF N=1 THEN 3400
3300  IF N=0  OR  WSH(N)=0 THEN 3400
3310    W10=WSH(N)+PHG(N)
3320    IF MAXP(I)<W10 THEN MAXP(I)=W10
3330  '
3400  DEFH(I)=MAXP(I)-PHG(PAD(I))
3410    IF MAXP(I) > PHG(PAD(I))+ WSH(PAD(I)) THEN 3420 ELSE 3500
3420    IF DEFH(I)>SWD  THEN WSH(PAD(I))=SWD ELSE WSH(PAD(I))=DEFH(I)
3500  RETURN
3510  '
```

When NPN 10 is 1, it means that the object paddy can discharge.

When the water level next paddy is higher chan the object paddy,
The maximum water level of next paddy become the water level of object paddy.

```
4000 '=============================================
4010 '--SUBROUTINE < POOR DRAINAGE PADDY SEARCH > --
4020 '
 4030  I=1
 4040  A=0:IF PAD(I) =999 GOTO 4440
 4050  MINP(I)=PHG(PAD(I))+1
 4060  N=NPN1(PAD(I))
 4065  IF N=0 THEN 4080 ELSE A=A+WSH(N)
 4066    W1=PHG(N)+WSH(N)
 4070    IF MINP(I)>W1 THEN MINP(I)=W1
 4080  N=NPN2(PAD(I))
 4085  IF N=0 THEN 4100 ELSE A=A+WSH(N)
 4086    W2=PHG(N)+WSH(N)
 4090    IF MINP(I)>W2 THEN MINP(I)=W2
 4100  N=NPN3(PAD(I))
 4105  IF N=0 THEN 4120 ELSE A=A+WSH(N)
 4106    W3=PHG(N)+WSH(N)
 4110    IF MINP(I)>W3 THEN MINP(I)=W3
 4120  N=NPN4(PAD(I))
 4125  IF N=0 THEN 4140 ELSE A=A+WSH(N)
 4126    W4=PHG(N)+WSH(N)
 4130    IF MINP(I)>W4 THEN MINP(I)=W4
 4140  N=NPN5(PAD(I))
 4145  IF N=0 THEN 4160 ELSE A=A+WSH(N)
 4146    W5=PHG(N)+WSH(N)
 4150    IF MINP(I)>W5 THEN MINP(I)=W5
 4160  N=NPN6(PAD(I))
 4165  IF N=0 THEN 4180 ELSE A=A+WSH(N)
 4166    W6=PHG(N)+WSH(N)
 4170    IF MINP(I)>W6 THEN MINP(I)=W6
 4180  N=NPN7(PAD(I))
 4185  IF N=0 THEN 4200 ELSE A=A+WSH(N)
 4186    W7=PHG(N)+WSH(N)
 4190    IF MINP(I)>W7 THEN MINP(I)=W7
```

The paddy that cannot discharge is searched.

The paddy that become excess flooding water is searched, and it's water level is decided.

```
4200  N=NPN8(PAD(I))
4205  IF N=0 THEN 4220 ELSE A=A+WSH(N)
4206    W8=PHG(N)+WSH(N)
4210    IF MINP(I)>W8 THEN MINP(I)=W8
4220  N=NPN9(PAD(I))
4225  IF N=0 THEN 4240 ELSE A=A+WSH(N)
4226    W9=PHG(N)+WSH(N)
4230    IF MINP(I)>W9 THEN MINP(I)=W9
4240  N=NPN10(PAD(I))
4245  IF N=1 THEN 4250 ELSE GOTO 4270
4250     N10=PHG(PAD(I))-.2
4260   IF MINP(I) > N10 THEN MINP(I)=N10 :GOTO 4400 ELSE 4400
4270  IF N=0 THEN 4400 ELSE A=A+WSH(N)
4272    W10=PHG(N)+WSH(N)
4280    IF MINP(I)>W10 THEN MINP(I)=W10
```

When NPN 10 is 1, it means that the object paddy can discharge, NPN 10 is looked upon as lower paddy (-0.20 m) than the object paddy.

When next water level is lower that own water level, return line 4040.

```
4290 '
4400 P=PAD(I)
4410  IF PHG(P)+WSH(P)-MINP(I)>0 OR A<.001 THEN 4430
4420    WSH(P)=MINP(I)-PHG(P)+.01
4422  IF WSH(P)>MAD THEN WSH(P)=MAD
4423  IF WSH(P)+PHG(P)>MAD+PHG(SO(E)) THEN WSH(P)=MAD+PHG(SO(E))-PHG(P)
4424    W(J)=W(J)+WSH(P)
4430  I=I+1 :GOTO 4040
4440    IF W(J)=W(J-1) OR J=20 THEN 4450 ELSE J=J+1 :GOTO 4030
4450 RETURN
4460 '
```

When water level of next paddy is higher than own water level, Own water level is raised 1 cm .
The calcualtion is repeated till own flooding water can be discharged.

When there is no water is level highering, examination is escaped from this subroutine.

```
5000 '=========================================
5010 '--- SUBROUTINE ( OUT OF RANGE SERRCH ) ---
5020 '
5030  IF WSH(PAD(I)) < MID-.005 THEN ME$="NO" :NO(E)=NO(E)+1 :NOV(E)=NOV(E)+DEFV
(PAD(I)):NPA(E)=NPA(E)+PAR(PAD(I)):GOTO 5070
5040  IF WSH(PAD(I)) > SWD +.001 THEN ME$="OVER" :DE(E)=DE(E)+1 :DEV(E)=DEV(E)+D
EFV(PAD(I)):DPA(E)=DPA(E)+PAR(PAD(I)):GOTO 5070
5050  IF WSH(PAD(I)) < SWD -.001 THEN  ME$="SHA" :SHA(E)=SHA(E)+1:SHAV(E)=SHAV(E
)+DEFV(PAD(I)):SPA(E)=SPA(E)+PAR(PAD(I)):GOTO 5070
5060   ME$ = " OK":OK(E)=OK(E)+1:OPA(E)=OPA(E)+PAR(PAD(I))
5070 RETURN
```

The paddy that has suitable water depth is examined.

The paddy that has deeper depth and shallower depth than standard depth is examined.
MEMO, volume of water and area is printed.

```
5080 '
8000 '  ************************
8010 '  *                      *
8020 '  *  DATA <BLOCK 1:2 >   *
8030 '  *                      *
8040 '  ************************
8050 '====================
8060 '--- DATA NUMBER ---
8065 '
8070      DATA 77                    Write the total line of the data.
8080 '
8090 '==================
8100 '--- PADDY DATA ---
8110 '
8120 '     PNO    PAR     PHG   NPN1 NPN2 NPN3 NPN4 NPN5 NPN6 NPN7 NPN8 NPN9 NPN10
8130 DATA  1 ,    76 , 7.02 ,  2 ,  6 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0
8140 DATA  2 ,   324 , 6.93 ,  1 ,  3 ,  5 ,  6 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0
8150 DATA  3 ,    79 , 6.98 ,  2 ,  5 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0
8160 DATA  4 ,   410 , 6.88 ,  5 , 15 , 16 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0
8170 DATA  5 ,   860 , 6.89 ,  2 ,  3 ,  4 ,  6 ,  7 , 15 ,  0 ,  0 ,  0 ,  0
8180 DATA  6 ,   500 , 6.89 ,  5 ,  7 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0
8190 DATA  7 , 1192 , 6.85 ,  6 ,  5 , 15 ,  8 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0
8200 DATA  8 , 1858 , 6.71 ,  7 , 14 , 13 ,  9 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0
8210 DATA  9 , 1142 , 6.61 ,  8 , 13 , 11 , 10 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0
8220 DATA 10 , 1870 , 6.46 ,  9 , 11 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0
8230 DATA 11 , 1015 , 6.46 , 10 ,  9 , 13 , 12 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0
8240 DATA 12 , 1291 , 6.44 , 11 , 13 , 18 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  1
8250 DATA 13 , 1284 , 6.62 ,  9 ,  8 , 14 , 18 , 12 , 11 , 17 ,  0 ,  0 ,  0
8260 DATA 14 , 1723 , 6.74 ,  8 , 15 , 16 , 17 , 13 ,  0 ,  0 ,  0 ,  0 ,  0
8270 DATA 15 , 1218 , 6.82 ,  7 ,  5 ,  4 , 16 , 14 ,  0 ,  0 ,  0 ,  0 ,  0
8280 DATA 16 ,  980 , 6.73 ,  4 , 21 , 17 , 14 , 15 ,  0 ,  0 ,  0 ,  0 ,  0
8290 DATA 17 , 1442 , 6.63 , 14 , 16 , 20 , 19 , 18 , 13 ,  0 ,  0 ,  0 ,  0
8300 DATA 18 ,  563 , 6.52 , 12 , 13 , 17 , 19 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0
8310 DATA 19 , 1730 , 6.50 , 18 , 17 , 20 , 24 ,  0 ,  0 ,  0 ,  0 ,  0 ,  1
8320 DATA 20 , 1483 , 6.58 , 17 , 21 , 23 , 24 , 19 ,  0 ,  0 ,  0 ,  0 ,  0
8330 DATA 21 ,  895 , 6.66 , 16 , 20 , 22 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0
8340 DATA 22 ,  743 , 6.61 , 21 , 23 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0
8350 DATA 23 , 2145 , 6.44 , 20 , 22 , 27 , 25 , 24 ,  0 ,  0 ,  0 ,  0 ,  0
8360 DATA 24 , 1815 , 6.51 , 19 , 20 , 23 , 25 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0
8370 DATA 25 ,  652 , 6.41 , 24 , 23 , 26 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  1
```

```
8380 DATA 26 , 1457 , 6.39 , 25 , 27 , 28 , 29 , 0 , 0 , 0 , 0 , 0 , 0
8390 DATA 27 , 1012 , 6.48 , 23 , 26 , 28 , 0 , 0 , 0 , 0 , 0 , 0 , 0
8400 DATA 28 , 458 , 6.39 , 27 , 26 , 29 , 31 , 0 , 0 , 0 , 0 , 0 , 0
8410 DATA 29 , 869 , 6.38 , 26 , 28 , 30 , 0 , 0 , 0 , 0 , 0 , 0 , 0
8420 DATA 30 , 830 , 6.37 , 29 , 31 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 1
8430 DATA 31 , 216 , 6.39 , 28 , 30 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0
8440 DATA 32 , 00 , 6.00 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0
8450 DATA 33 , 00 , 6.00 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0
8460 DATA 34 , 00 , 6.00 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0
8470 DATA 35 , 00 , 6.00 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0
8480 DATA 36 , 00 , 6.00 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0
8490 DATA 37 , 00 , 6.00 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0
8500 DATA 38 , 00 , 6.00 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0
8510 DATA 39 , 00 , 6.00 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0
8520 DATA 40 , 00 , 6.00 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0
8530 DATA 41 , 2007 , 6.48 , 42 , 47 , 48 , 49 , 0 , 0 , 0 , 0 , 0 , 0
8540 DATA 42 , 998 , 6.44 , 41 , 43 , 46 , 47 , 0 , 0 , 0 , 0 , 0 , 0
8550 DATA 43 , 439 , 6.47 , 42 , 44 , 46 , 0 , 0 , 0 , 0 , 0 , 0 , 0
8560 DATA 44 , 1603 , 6.41 , 43 , 45 , 63 , 64 , 0 , 0 , 0 , 0 , 0 , 0
8570 DATA 45 , 1907 , 6.34 , 44 , 63 , 62 , 60 , 53 , 46 , 0 , 0 , 0 , 0
8580 DATA 46 , 627 , 6.45 , 43 , 45 , 53 , 47 , 42 , 0 , 0 , 0 , 0 , 0
8590 DATA 47 , 1505 , 6.46 , 41 , 42 , 46 , 53 , 51 , 48 , 0 , 0 , 0 , 0
8600 DATA 48 , 1524 , 6.45 , 41 , 47 , 51 , 50 , 49 , 0 , 0 , 0 , 0 , 0
8610 DATA 49 , 1164 , 6.46 , 41 , 48 , 50 , 0 , 0 , 0 , 0 , 0 , 0 , 0
8620 DATA 50 , 1093 , 6.45 , 49 , 48 , 51 , 52 , 0 , 0 , 0 , 0 , 0 , 0
8630 DATA 51 , 1257 , 6.38 , 50 , 48 , 47 , 53 , 52 , 0 , 0 , 0 , 0 , 0
8640 DATA 52 , 2399 , 6.35 , 50 , 51 , 53 , 55 , 56 , 0 , 0 , 0 , 0 , 0
8650 DATA 53 , 2414 , 6.26 , 47 , 46 , 45 , 60 , 54 , 55 , 52 , 51 , 0 , 0
8660 DATA 54 , 1668 , 6.34 , 53 , 60 , 59 , 58 , 55 , 0 , 0 , 0 , 0 , 1
8670 DATA 55 , 1365 , 6.40 , 52 , 53 , 54 , 57 , 56 , 0 , 0 , 0 , 0 , 0
8680 DATA 56 , 1136 , 6.38 , 52 , 55 , 57 , 0 , 0 , 0 , 0 , 0 , 0 , 0
8690 DATA 57 , 2278 , 6.38 , 56 , 55 , 58 , 0 , 0 , 0 , 0 , 0 , 0 , 1
8700 DATA 58 , 465 , 6.36 , 57 , 54 , 0 , 0 , 0 , 0 , 0 , 0 , 0 , 0
8710 DATA 59 , 2165 , 6.21 , 54 , 60 , 61 , 67 , 0 , 0 , 0 , 0 , 0 , 0
8720 DATA 60 , 1813 , 6.20 , 53 , 45 , 62 , 61 , 59 , 54 , 0 , 0 , 0 , 0
8730 DATA 61 , 1315 , 6.31 , 60 , 62 , 66 , 67 , 59 , 0 , 0 , 0 , 0 , 0
8740 DATA 62 , 1338 , 6.36 , 45 , 63 , 65 , 61 , 60 , 0 , 0 , 0 , 0 , 0
8750 DATA 63 , 1179 , 6.37 , 44 , 64 , 73 , 70 , 65 , 62 , 45 , 0 , 0 , 0
8760 DATA 64 , 1053 , 6.40 , 44 , 63 , 73 , 0 , 0 , 0 , 0 , 0 , 0 , 0
8770 DATA 65 , 1354 , 6.34 , 62 , 63 , 70 , 66 , 0 , 0 , 0 , 0 , 0 , 0
8780 DATA 66 , 1338 , 6.27 , 61 , 65 , 70 , 69 , 68 , 67 , 0 , 0 , 0 , 0
```

Next items is written.

Paddy lot number, area, ground height of paddy, next paddy number.

[example]

Line 8130 - 8430 ... Block I
(Data 1)-(Data 31)

Line 8530 - 8890 ... Block II
(Data 41)-(Data 77)

Missing number cannot make at data number (PNO)

```
8790 DATA 67 , 2339 , 6.20 , 59 , 61 , 66 , 68 ,  0 ,  0 ,  0 ,  0 ,  0 ,  1
8800 DATA 68 , 1699 , 6.17 , 67 , 66 , 69 , 77 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0
8810 DATA 69 , 1250 , 6.24 , 66 , 70 , 71 , 76 , 77 , 68 ,  0 ,  0 ,  0 ,  0
8820 DATA 70 , 1062 , 6.27 , 65 , 63 , 73 , 72 , 71 , 69 , 66 ,  0 ,  0 ,  0
8830 DATA 71 ,  738 , 6.27 , 70 , 72 , 75 , 69 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0
8840 DATA 72 ,  977 , 6.31 , 70 , 73 , 74 , 75 , 71 ,  0 ,  0 ,  0 ,  0 ,  0
8850 DATA 73 , 1537 , 6.36 , 63 , 64 , 70 , 72 , 74 ,  0 ,  0 ,  0 ,  0 ,  0
8860 DATA 74 ,  415 , 6.37 , 73 , 72 , 75 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0
8870 DATA 75 ,  614 , 6.20 , 74 , 72 , 71 , 76 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0
8880 DATA 76 ,  221 , 6.15 , 75 , 69 , 77 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0
8890 DATA 77 , 2489 , 6.06 , 76 , 69 , 68 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  1
8930 '
9000 ========================
9002 --- WATER DEPTH TABLE ---
9004 '
9010  SWD=.05  :MAD=.05  :GOTO 930
9020  IRG=.03  :MAD=.15  :GOTO 930
9030  SWD=.05  :MAD=.09  :GOTO 2862
9040  SWD=.05  :MAD=.11  :GOTO 930
9050  SWD=.05  :MAD=.13  :GOTO 930
9060  SWD=.05  :MAD=.15  :GOTO 930
9070  SWD=.05  :MAD=.17  :GOTO 930
9080  SWD=.05  :MAD=.19  :GOTO 930
9090  SWD=.05  :MAD=.21  :GOTO 930
9100  SWD=.05  :MAD=.23  :GOTO 930
9110  SWD=.05  :MAD=.25  :GOTO 2862
9120  SWD=.05  :MAD=.15  :GOTO 930
9130  SWD=.05  :MAD=.15  :GOTO 930
9500 '------------------
9505 '-- MEMORY CHECK --
9510 A=FRE(1)
9520 B=FRE(A$)
9530 PRINT A,B
9540 END
```

The condition is established.

The condition of line 740, 750 is changed,

calcualtion is repeated.

The condition of the following can be changed.

SWD .. Standard water depth.

MAD .. Maximum allowable water depth.

MID .. Minimum allowable water depth.

PRE .. Presaturation water depth.

IRQ .. Irrigation requirement

When you want to stop the calculation,

change : GOTO 2862.

BLOK I

Bil.	Nama Pengusaha	Tahun Lahir	Alamat	Nombor Lot	Luas Petak $\times 10^{-3}$ ekar (depa)	(m^2)	Catitan
1.	Hj.Awang b. Abdullah	1920	Kg.Tunjung	1910	402	1870	Blok II 1850
2.	Samat b. Awang	1904	Kg.Tunjung	1865 A	306.3	1442	Blok II 1837
				1865 B	306.5	1483	
3.	Yaman b. Ismail	1927	Kg. Manak, Pendek	1912	459	1858	Blok II 1840
4.	Zakaria b. Idris	1924	Kg.Tunjung	1866,	221.1	895	Blok II 1855,1856
5.	Hj.Ahmad b. Awang	1918	Kg.Tunjung	1911 A	317.2	1284	Blok II 1863
				1911 B	282.1	1142	
				1913	425.8	1723	
6.	Mohamed b. Jusoh	1937	Kg.Tunjung	1848	530.1	2145	Blok II 1836
							Blok III 1818,1827,18
7.	Ab.Rahman b. Harun	1919	Kg.Tunjung	1864	427.5	1730	Blok III 1830
8.	Ab.Kadir b. Junoh	1938	Kg.Tunjung	1849 A	161	652	
				1849 B	448.4	1815	
9.	Saat b. Ab.Rahman	1934	Kg.Tunjung	1847 A	250	1012	Blok II 1851
				1847 B	113.1	458	
10.	Esah bt. Dollah	1952	Kg.Tunjung	1846 A	214.8	869	
11.	Ismail b. Awang	1919	Kg.Tunjung	1846 B	360.1	1457	
12.	Hj.Mohd. b. Salleh	1931	Kg.Tunjung	1844	206	830	Blok II 1844
13.	Zakaria b. Salleh	1925	Kg.Tunjung	1867	222.3	900	Blok II 1842
14.	Ab.Rani b. Yaakob	1929	Kg.Tunjung	1858 A	139.1	563	Blok II 1858,1907
15.	Minah bt. Md.Zain	1938	Kg.TUnjung	1862 A	250.7	1015	
				1862 B	319.1	1291	
16.	Mek Jar bt. Awang Besar	1919	Kg.Tunjung	1914	301	1218	
17.	R. Daud b. R. Mamat	1923	Kg.Tunjung	1915 A	101.2	410	
				1915 B	212.5	860	
				1915 C	123.5	500	
					7201.4		

13. Data sheet. [BLOCK A] No. 1

1	1929A	716	7.02	2	6									
2	1929B	324	6.93	1	3	5	6							
3	1928	79	6.98	2	5									
4	1915A	410	6.88	5	15	16								
5	1915B	860	6.89	6	7	15	4							
6	1915C	500	6.89	5	7									
7	1916	1192	6.85	6	5	15	8							
8	1912	1858	6.71	7	14	13	9							
9	1911B	1142	6.61	8	13	11	10							
10	1910	1870	6.46	9	11									
11	1862A	1015	6.46	10	9	13	12							
12	1862B	1291	6.44	11	13	18								D
13	1911A	1284	6.62	9	8	14	17	18	12	11				
14	1913	1723	6.74	8	15	16	11	13						
15	1914	1218	6.82	7	5	4	16	14						
16	1867	900	6.73	4	21	17	14	15						
17	1665A	1442	6.63	14	16	20	19	18	13					
18	1858A	563	6.52	12	13	11	19							
19	1864	1130	6.50	18	17	20	24							D
20	1865B	1483	6.58	17	21	23	24	19						

鈴木専門家報告

（昆虫学）

昭和 58 年 12 月 21 日 ～ 昭和 59 年 2 月 20 日

及び

昭和 59 年 6 月 27 日 ～ 昭和 59 年 8 月 26 日

調　査　結　果　要　約

プロジェクト名　マレーシアにおける水管理計画

報　告　者　東北農業試験場栽培第一部

虫害研究室長　鈴　木　忠　夫

目　　的　ケランタン州における水稲害虫講義用ノートと訓練用材料の準備およびこれらの研究と防除

期　　間　第1回　雨期作　S58.12.21～S59.2.20

第2回　乾期作　S59.6.27～S59.8.26

報告内容

雨期作

(1) ケランタン州における病害虫と自然災害による被害（干ばつ，ねずみ，水害，カメムシ類，メイチュウなど）

(2) 主要水稲害虫の種類と主要天敵調査（約21種の害虫と9種の天敵について同定と標本作製）

(3) イネクロカメムシの発生被害調査と防除対策（発生の品種間差異，生息密度と被害解析，雌雄判定法，防除法の指導）

(4) 主要水稲害虫の発生生態と防除（イネクロカメムシ以外の害虫の生態と防除法の解説）

(5) 水稲栽培における水管理と害虫発生との関係（メイチュウの水管理による休眠覚醒による点とクロカメムシは水深を深くすることによる防除効果の促進）

(6) 昆虫標本作製法と実地指導（解説書の作製とそれによる指導）

(7) その他（防除歴の試作，誘蛾灯採集虫の同定，計数法，グラフの作製）

乾期作

(1) 主要水稲害虫の種類と重要度一覧表（雨期調査に7種を追加し整理する）

(2) 誘蛾灯の誘殺状況と本田発生との関係を解析（誘蛾灯による発生予察を目ざして解析を行なう。害虫と天敵を含め15図作製）

(3) 教材用昆虫標本の作製と展示（主要害虫の各態と被害標本の作製，害虫7セット，天敵1セット）

(4) デモファームの害虫防除法のアプローチ（栄養生長期と生殖生長期に分け説明）

(5) その他調査

i　水深とメイチュウの心枯被害

（０～30cmの間で特に差はなかった）

ii．メイチュウ類による心枯茎の品種間差異

4品種調査　平均36％

iii．　〃　種類の構成

（ダイメイチュウ　46％，クロメイチュウ　33％，サンカメイチュウ　14％，新害虫（未同定）　6％）

iv．ツマグロヨコバイの種類別構成

タイワンツマグロ　81％

クロスジ　〃　13％

パルバス，マラヤヌス　6％

v．メイチュウ類の種類別による白穂の割合

ダイメイチュウ　68％

クロメイチュウ　26

サンカメイチュウ　5

vi．誘蛾灯に誘殺されたウンカの種類の割合

（トビイロウンカ　80％，キジロウンカ　20％）

鈴木専門家現地レポート

（昆　虫　学）

—第1回　雨期作時調査—

REPORTS .

Project name	:	Water Management Training Programme in Malaysia.
Objectives	:	To prepare lecture note and training materials on Insect pests and its control for rice cultivation and to study rice Insect pests in Kelantan.
Period	:	From Dec. 21st. - 1983. to Feb. 20th. - 1984.
Name	:	Tadao Suzuki.

C O N T E N T S .

Preface.

I worked at the National Water Management Training Centre for two months from the 23rd. Dec. 1983 to 19th. Feb. 1984, as a short term expert on rice Entolomogy. When I just arrived here, I found severe damage caused by malayan black rice bug in the DF field. Besides that, I also want to study the occurence of other insect species by sweeping, surveillance, light trap at DF, and supplemetary survey neighbouring at farmer's fields at DF and at KADA area. From the survey and literatures available to me, I can understand the rice insect problem in Kelantan. I summerized the result of my surveys and work that was caused out here for the last two months in the insect pest of this report.

I wish to record my most sincere thanks to Ir. C.C.Chan, Director, for his kindness, I am grateful to Mr. Nik Ariff Sulaiman, Agronomist, for his good guidance, I wish to express my gratitude to Mr. Khor Kheng Wee, Agriculture Assistant, for his assistance. Also, I wish express my thanks to all staff of NWMTC. Finally, I wish to express my thanks to the Japanese Team, Mr. Oguchi, Team Leader, Mr. Shimada, Agronomy, Mr. Muramatsu, Irrigation/Drainage, Mr. Matsuzawa, Water Management and Mr. Watanabe, coordinator for their help and encouragement.

I. Damages caused by insect pests, disease and natural disaster in Kelantan.

(1) Insets pests, disease and natural disaster for off-season padi at Kelantan in 1982.

	Species	Occurence areas	% of occurence areas	Damage areas	% of damage areas
		ha		ha	
1.	Green bug (Leptocorisa spp.)	456.07	(2.18)	10.62	0.051
2.	Stem borer	160	(0.765)	10	0.048
3.	Rat	514	(2.457)	70.3	0.336
4.	Bird	–	–	–	–
5.	Wild pig	–	–	–	–
6.	Drought	75	(0.358)	2	0.01
7.	Flood	10	(0.048)	5	0.024
8.	Fungus	50	(0.239)	0	0

9.	Other disease and natural disaster	16	(0.076)	1	0.005
	Total	1,281.07	(6.123)	98.92	(0.473)

* Total area planted 20,921.024 ha.

(2) Insect pests, disease and natural disaster for main season padi at Kelantan in 1981 - 1982.

	Species	Occurence areas	% of occurence areas.	Damage areas	% of damage areas
1.	Green bug	3,221	(7.387)	22	0.051
2.	Stem borer	1,242	(2.849)	2	
3.	Rat	3,868	(8,871)	684.5	1.57
4.	Bird	39	(0.089)	9	0.021
5.	Wild pig	2	(0.005)	2	0.005
6.	Flood	6,502	(14.912)	474	1.087
7.	Drought	18,228.84	(41.808)	7,135.347	16.365
8.	Black rice bug	1,520	(3.486)	368	0.844
9.	Fungus	60	(0.138)	5	0.012
10.	Domestic animal	8	(0.018)	2	0.005
11.	Others	20	(0.046)	8	0.018
	Total	34,711.84	(79.611)	8,711.847	(19.881)

Total area planted 43, 601.773 ha.

II- 1 Insects pests list checked for Kelantan Malaysia.

Japanese name.	Common name	Species	Malaysian name.
(マライヤン)クロカメムシ	Malayan black rice bug	Scotinophara coarctata(Fabricius)	Kutu berung.
ミナミクモヘリカメムシ	Rice bug	Leptocorisa Oratorius (Fabricius)	Kesing, pianggang, cenanggan
ミナミアオカメムシ	Southern green stink bug	Nezara viridula (Linne)	Kesing hijau.
ホソハリカメムシの1種	(Stink bug)	Celetus sp.	-
トウヨウイネクキミギワバエ	Rice whorl maggot	Hyderillia philippina (Ferino)	Lalat hijau.
イネミズメイガ	Rice case worm	Nymphula fluctuocalis (Zell)	Ulat layar.
コブノメイガ	Rice leaf folder or Rice leaf roller	Cnaphalocrocis medinalis (Guenee)	Ulat lipat daun, gulung daun
イネトゲトゲ	Rice hispa	Dicladispa armigera (Olivier)	-
サンカメイチュウ	Yellow stem borer	Tryporyza (Scirpophaga) incertulas (Walker)	Ulat pengorik batang.
シロメイチュウ	White stem borer	Tryporyza (Scirpophaga) innotata (Walker)	-
ネッタイメイチュウ	Dark headed rice borer	Chilo polychrysus (Meyrick)	-
ダイメイチュウ(イネヨトウ)	Pink rice borer	Sesamia inferens (Walker)	-
アワヨトウ	Army worm	Pseudaletia separata (Walker)	Ulat ratus.

II-1 Insects pests list checked for Kelantan Malaysia.

Japanese name	Common name	Species	Malaysian name.
イネツトムシ	Rice plant skipper	Parnara guttata (Bremer et Grey)	-
タイワンツマグロヨコバイ	Green rice leaf hopper	Nephotettix virescens (Distant)	Bena hijau.
クロスジツマグロヨコバイ	Green rice leaf hopper	Nephotettix nigropictus (Stal)	-
トビイロウンカ	Brown plant hopper	Nilaparvata lugens (Stal)	Bena perang.
セジロウンカ	White back plant hopper	Sogatella furcifera (Horvath)	Bena belalang putih.
ハネナガイナゴ	Smaller rice grass hopper	Oxya japonica (Thunberg)	Belalang padi.
イナズマヨコバイ	Zig zag - striped leaf hopper	Recilia dorsalis (Motschulsky)	-
シロナヨトウ	Rice army worm or Rice swarming caterpillar .	Spodoptera mauritia (Boisduval)	Ulat ratus.

II-2, Some natural enemies of rice insect pests.

	Species	Remark
*	Cyrtorhinus lividipennis Reuter	Predator of hopper eggs and young nymph
*	Casnoidea interstitialis	Predator of rice pests
*	Paederus fuscipes Curtis	Predator of rice pests
*	Micrapis discolor (Fabricus)	Predator rice pests
	Neurothemis tullia tullia (Drury)	Predator of rice pests
	Conocephalus longipennis (di Haan)	Predator of the egg mass of rice stemborers and other insect pests
	Tetragnatha madibulata Walckenaer	Predator of rice pests
	Sededon ferruginosa Wiedeman	Alternate host of egg-parasite of the species of trichogramma
*	Coccinella arcuata	Predator of hopper and other rice pests

Note * attracted to light trap

III. Outbreak of Scotinophara coarctata Fabricius (Malayan Black Rice Bug) and its control.

1. Information.

(1) By Heong (1977).

Black rice bug which feeds chiefly at the base of the stems had only been regarded as a minor pest of rice in Malaysia until recently. In certain localities, severe damage by preventing the grain formation or completely destroying the plant have been observed (Lim, 1975). The severely attacked plants appear stunted; the leaves turn yellow, then reddish brown and eventually die. Even one insect, given sufficient feeding time (16-17 days), could kill a plant (Lim, 1975). During an outbreak, as many as 15 insects per plant could be observed.

(2) By Chang (1981), MARDI (1980).

Malayan black rice bug has become quite common in peninsular Malaysia in recent years and large numbers been observed attracted to lights. In field, a sudden influx of adults can result in as high as 60 adults per hill. In many cases, the number rapidly declined in the following weeks without any control action taken (MARDI, 1980).However, the insect is potentially a serious pest and has been observed to completely destroy a crop through its feeding.
Control measures : Chemical control against S. coarctata is difficult because of their cryptic habit of hiding among the bases of the tillers and their thick integument, but studies are currently being made to screen effective insecticides against this pest.

(3) By Mochida (1982).

The black bug, S. coactata was first reported as a serious rice pest on the southwestern Philippine island of Palawan 1979. Since then, swarms of black bugs have caused substantial damage to wetland rice on farmers as far as 250 km, from the discovery site.

It is believed that black bug adult can fly long distance, as far as 250 km. also,that population densities seem low under raified conditions but have increased with expanding irrigation.

A long period of rice cropping may encourage growth of black bug population, especially in staggered plantings. main food plants other than rice are grasses and sedges. Black bug, however will attack colocasia, cucumber, okra and maize.

The egg stage is about 5 days and the nymphal stage is 5-6 weeks. Adults often survive for 2 months. Eggs are laid at the base of rice plants near the water surface. Adults and nymphs stay at the plants base during bright days and crawl upward during evenings and cloudy or raining days. Population are particularly abundant in poorly drained rice fields, especially those surrounded by swamps and abandoned fields populated with grass and sedges.

Nymph and adults suck juices from leaf sheathes. leaves and panicles, causing plant death.

Interium chemical control seem to be the only practical methods include : Contact insecticides to supplement systemic insecticides, coordinated control measures, draining unplanted rice fields, and pest eradication with chemicals.

2. Occurence and chemical control at the Demofarm field.

During the main season, (1981/82), Black bug damage was severe and in 1983 off season the damage was slight,

but then in December 1983/1984 main season it again caused severe damage . Symptons of damaged plant are the same as those described by Lim (1975), and Mochida (1982) where it resembles damage caused by stemborer due to the apperance of dead heart. Difference of both damaged symtons can be seen upon dissection of the sheath. Bugs damage the sheath by its piercing and sucking habits where as damage caused by stem borer is due to its boring and chewing of plant tissues. During the outbreak of the bugs in the field on the 26th. December 1983, as many as 30-40 adults per hills could be observed. Lebaycid 50 EC, at the rate of 10 cc/10 1, (160 L/ha) was sprayed by high pressure sprayer to control bugs on the following day.

A comparison was made to determined the effectivesness of control between sprayed plots having 2 different water level i.e. shallow water (5cm) and deep water (10 cm). An assesement on the number of adults was made 48 hrs. after spraying. A total of 250 hills were assessed at random for each plot and the total number of adults recorded was 0 and 4 for the deep and shallow water plots respectively. Towards the end of January, plants in both plots have since recorded when chemical control have been carried out, but, at the beginning of February, a large number of nymph could be observed at the base of hills, especially in shallow water (5 cm) spray plot. This indicates the upstands of water level in areas where the bugs is a constant problem.

3. Summary and suggestion.

Malayan black rice bug is the injurious insect pest at Demo-farm of NWMTC. Causal reasons on the frequent outbreak of the black bug are still not clear due to the lack of information. Most of the literatures available Hoeng (1977), Chang (1981), MARDI (1980), Mochida (1982) are its life cycle, symtons of damage and are mainly on insecticides of control.

Information available can be summerized as follows:

1) General ecology

(a) Black bug was reported as a serious rice pest recently.

(b) Adults as swarms and can fly lond distance, as far as 250 km.

(c) Number of adults/hill can be as high as 60, mainly due to its sucking habit severely effected plants become stunted, leaved turn yellow, then brown, the youngest and unopened leaf becomes dry and discolor resembling 'dead hearts' cause by stemborers, discolor like dead heart (same as stem borer damages) and eventually the whole plant dies.

(d) Besides it also feeds on grasses and sedges.

(e) Attracted to light, especially during full moon period.

(f) Population densities have increase with expanded irrigation areas where there is especially in staggered planting. Population are particularly abundant in poorly drained rice fields, especially those surrounded by swamps and abandon fields populated with grasses and sedges.

(g) In single cropping areas usually 2 generations can be found and this can extend up to 4 generation for double cropping areas. occur 4 generations.

(h) Effective natural enemies not in abundance.

2. Control methods.

Chemical control is make difficult bugs prefer to stay at the bases of the tillers and they have thick integument. But, as an interium measure, chemical control is the only practical methods. In fields where water level is easily control, deep water irrigation should be encouraged prior chemical application to force the bugs to the upper parts of the plant for more effective control. A spray of any contact insecticides followed by a systemic well give an effective control. Chemical control is essential when black rice bug density is more than 5/hill.

3. *Selected references.*

Chang, P.M (1981) : Insect pests of paddy in MALAYSIA Tropical Agriculture Research series No. 14. Japan.

Heong, K.L (1977) : Proceeding rice review meeting. 1979, Bumbung Lima, Penang, Malaysia.

Mochida (1982) : the IRRI reporter 1/82.

IV. Occurrence and control of the major rice insect pests (except, black rice bug)

1. Rice stemborer.

(1) General note.

The rice stemborer is an important insect pest of rice in Malaysia.

In Kelantan four main species have been recorded. They are Tryporyza incertulas, Chilo polychrysus, Tryporyza innotta and Sesamia inferens. T. incertulas is the dominant species up to now. T. innotta is of recent discovery in Kelantan. They are frequently obtained in the light traps. Taxonomical revisions have been neccessity.

It was stated that double cropping intensify the problem of staggered planting and also the problem of damage by stemborers but, this appear not to be so at D.F., Pathak and Dyck (1973) reported that up to 10 % dead hearts within the maximum tillering period did not caused significant yield losses. Low incidence of rice stemborer did not occur in all the rice growing areas. Thus, the use of insecticides is not neccessary the only reason for the low incidence.

Studies by Pagden (1930; 1932) and Ooi (1974) indicated that natural enemies of rice borers occured in significant numbers in the rice fields.

Therefore the use of insecticides should be minimized to enhance the population of the existing natural enemies.

(2) Chemical control

After transplanting
- 30 days (or 15, 40 days) 1st.gener.
- 70 days (heading stage) 2nd.gener.

Due to its simplicity in application, granular insecticides were often prefered by many farmers. At present, granular fomulation of BHC, endosulfuran and carbofuran are favoured for stemborer control. But these chemicals have long residual effect and highly toxic to fish.

2. Green leaf hopper.

There are four species of Nephotettix recorded in Malaysia, N. virescens, N. nigropictus, and two other species. In Kelantan, N. virescens is the dominant species and N. nigropictus is rather rare. N. virescens is the most important transmitter of the penyakit mera virus (PMV, Tungro) and padi Jantan (Yellow dwarf) disease of rice.

Damages caused by direct feeding of the leafhopper is usually not important.

For effective control of PMV (Tungro).

Seedling sprayed with BPMC were completely protected and at 4 weeks after spraying a 71.1 percent protection was still available.

The build up of leafhoppers have been observed to be encouraged by extended staggered planting (Lim. 1972) which could be avoided by planting together. Otherwise, the hopper population could be checked by the use of insecticides or resistant varieties.

Chemical control

The following insecticides are effective to control the leafhopper:-

MIPC, methomyl, BPMC, Carbofran, MTMC.

3. Rice planthopper.

(1) Ecology and damages.

Generally, more brachypterous (longwinged) adults are obtained in the first generation. The brachypterous form usually lay more eggs than the macropterous (shortwinged) forms.

Serious damage to the rice crop may occur in the months of February anf July, which are usually the maturing periods of the respective rice crops.

''Hopperburn'' can be observed in the second generation. More than 200 hoppers per hill may be obtained.

(2) Natural enemy.

An important egg and nymph predator, Cyrtorhinus lividipennis can be found in large number in the light trap. Paederus sp. and Cnemidia spp. are the other predator normally caught in the light trap. Spiders also play a very important roles as predators. Eggs parasitism by Anagrus sp. may be high. Other natural enemies also play important roles.

(3) Chemical control is the same as for leafhoppers.

4. Rice bug (Leptocorisa spp.)

(1) Ecology and damage.

L. oratorius is the dominant species in Kelantan. (identifying : IRRN 6:1 Feb. 1981 P. 20 - 21), The rice bug injures the grains by its feeding habit.

1) Damage during the milk stage result in empty /unfilled grains.
2) Damage during the dough stage causes ''pecky rice'' (discoloration of natural grains)

The first injury causes yield loss, the second impair grain quality.

In an outbreak in Kelantan, a 36 % reduction in yield was reported (Lim 1971 : 1972).

Seasonal fluctuations of the adults could be determined by the light trap.

Simple method like net sweeps can also be used but the adults occasionaly fly off.

(2) Chemical control

Tentative economic threshold is noted to be more than 2 per hill at the milky stage by sight counting, insecticides should be used.

A number of chemicals have been found to be effective among them, BPMC and Linden are effecctive.

5. Leaf feeding insects.

A few Lepidopterans, viz. Cnaphalocrosis medinalis, Nymphula depunctalis, Spodoptera maurita, rice skipper and whorl maggot may be important. Most of the insects cause damage by feeding on the leaves of the rice plants.

1) Cnaphalocrosis medinalis (Rice leaf folder)

The larvae spin the leaves into rolls, which it feeds by scrapping the leaf tissues. Recently, this species has been observed to be severe and infesting the crop up to harvesting stage and damaging the flag leaves. In Bumbong Lima, where more than 90 % of the (flag) leaves were damaged, a 30 % yield loss was recorded like the plant hoppers, adults can fly long distances with the current emphasis on high yield production, it favours the emergence of this species as a major pest of rice.

2) Nymphula depunctalis (Rice case worm). The larvae lives inside a tubular case made from pieces of leaf cut from the plant and rolled into a tube. It can be remain beneath the water level. The larvae feeds on the leaves and also causes numerous 'holes' on the leaf sheath. In a severe attack, young rice plants may be completely destroyed and the plant dies.

3) Spodoptera mauritia (Rice swarming caterpillar)

The larvae occur sporadically and may cause serious difoliation. The chemicals commonly used against the leaf feeding insects are carboryl and endosulfan.

V. Relation between the rice culture practices and occurence of insect pests.

1. Cultural control method of rice stem borer by water management.

In the dry season the stem borer larvae are usually in aestivation or diapause in the deep stubbles. Emergence of moths of the aestivation or diapausing generation may be governed by rain fall. Contact of water either of irrigated or rain, break the diapause or aestivation of full-grown stem borer larvae and stimulate it to pupate and the moths appear four to six weeks later. This almost simultineous appearence of the first moth generation after the dry monsoon is called ''stubble flight''. Theoritically, the delay of transplanting until after peak emergence of stem-borer moths may decrease heavy losses.

As pointed out above, the interval between the initial date of flooding and transplanting should be more than one month or less than two months.

Light trap survey are effective to know the emergence of the stem-borer moths.

2. Relation between the water level and the insect pest control.

the study between the water level and occurence of the insects seems to be rarely conducted.

Generally, insects live the base of rice plant, i.e. planthopper, stem borer and black rice bug would be prefered the shallow water level.

In the case of chemical control, granular insecticides are broadcasted usually at the snallow water level (4–5 cm.). Black rice bug are effective to spray the solution at deep water level (10 cm.), if possible.

Appendix I.

Varietal preference of Malayan black rice bug.

Variety	Total No.of tiller	Total No. of dead hearts	No. of dead hearts / hill	% of Dead hearts
MR 1	517	14	0.47	2.7
MR 7	594	47	1.57	7.9
MR 10	655	13	0.43	1.98
MR 27	877	90	3.0	10.26
MR 42	652	69	2.3	10.58
MR 43	769	94	31.3	12.22

Date of transplanting 2/11/1983

planting distance 25 cm × 25 cm.

No. of hills assessed per variety 30 hills.

date of assessment. 3/Jan. 1984

Appendix II.

Damage study of Malayan Black Rice Bug.

(1) Method of the test.

No. of Black rice bug/hill : 0, 7, 15, 30, (male and female)

Padi variety : MR 27 (Kadaria)

Reared periods : 1983, 27/Dec. - 1984, 5/Feb.

1 hill/ 1/20,000 are pot ∴ 1 replication.

Crop stage : non productive tillering period.

Rearing methods : rearing cage covered with tetron gauze net.

date of survey : 5/Feb. 1984.

(2) Results.

No. of black rice bug/ hill.	No. of productive tillers	Remarks.
0	10	-
7	5	-
15	0	hill is still green
30	0	hill is completely dead.

(3) Chemical control is essential when black rice bug density is more than 5/hill.

Appendix III.

Key to identification of the male and female Malayan black rice bug (Scotinophara coarctata F.)

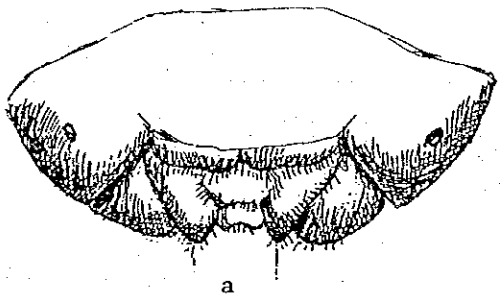
Note: The difference between the sexes of the black rice bug lies at external genitalia of the final abdominal segment

2) Morohological shape of the genitalia differs between female and male (figure 1)

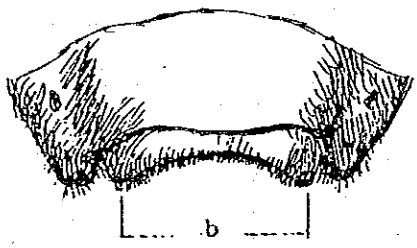
1) Female are biger than males in body size.

3) Distance of a-(female), b-(male) (figure)
Female (a) = 0.448 ± 0.036 mm (N = 39)
Male (b) = 1.105 ± 0.046 (N = 32)

4) Sex difference can easily identify by the hand lens (x 25)



Female



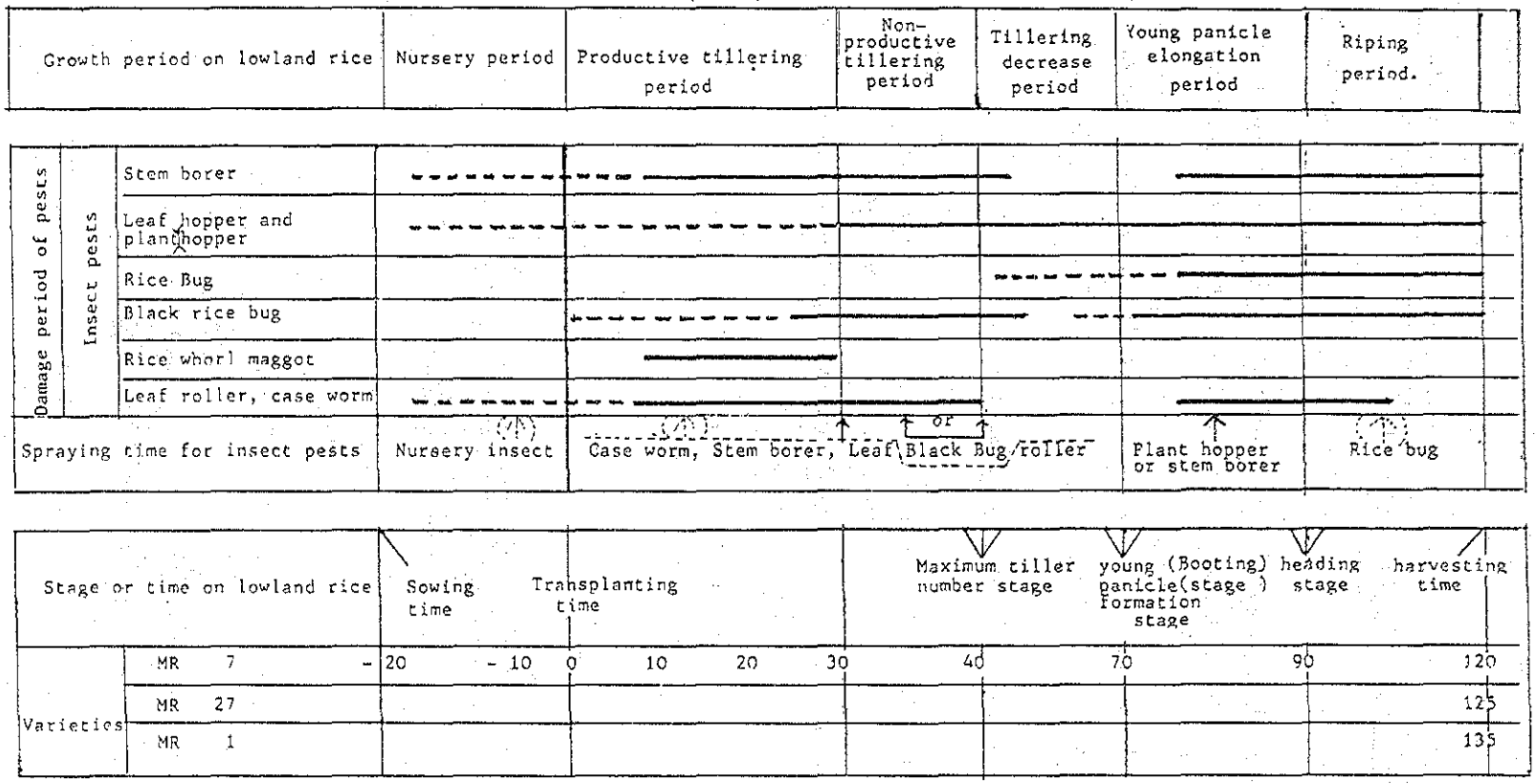
Male

Figure I.

Appendix IV.

INSECT PEST CONTROL PROGRAM FOR LOWLAND RICE

IN KELANTAN (DRAFT).



Economic threshold level of the major insects (1980)

Appendix V

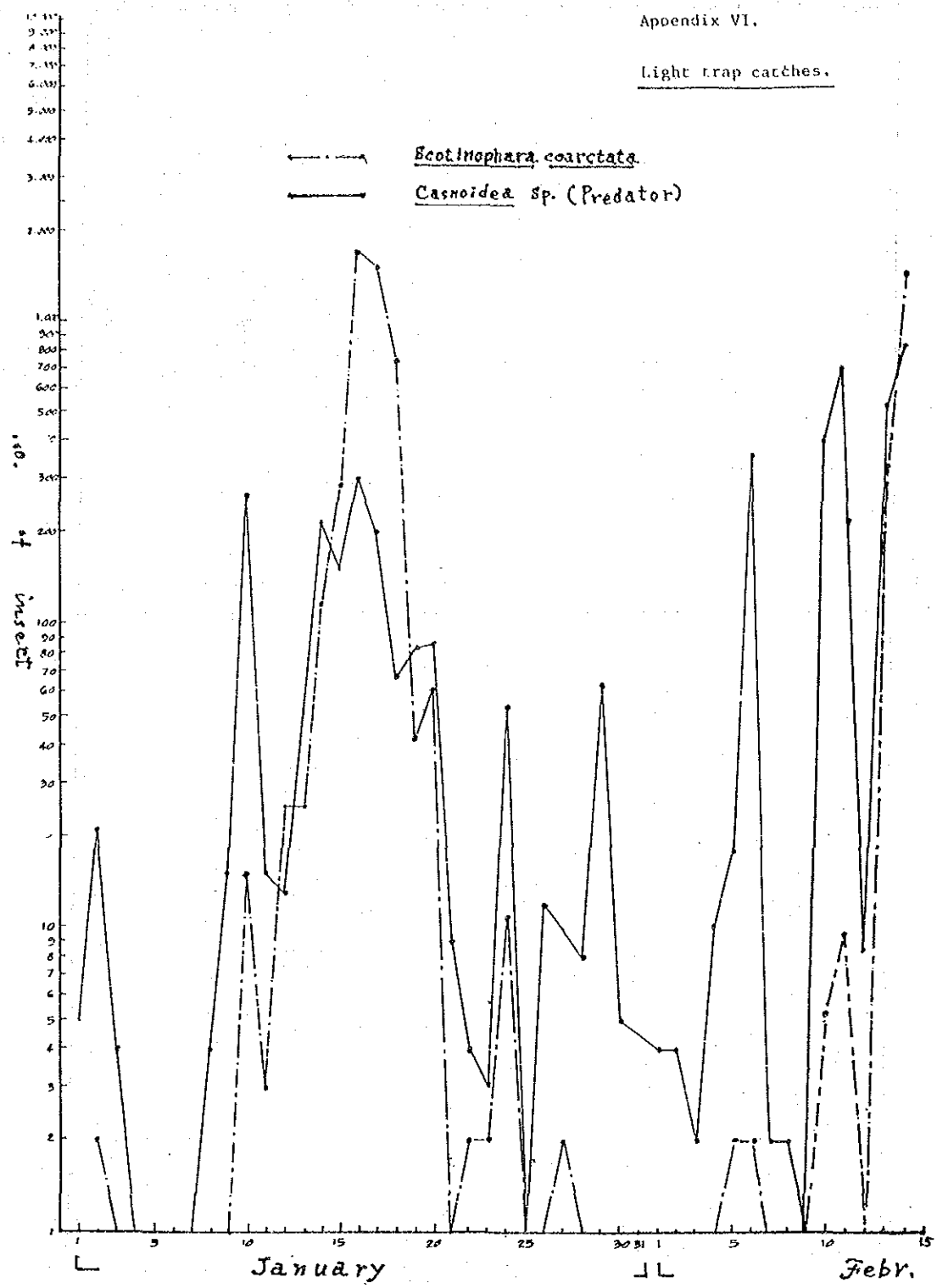
(A) Nursery	
(1) Leaf hoppers	15/sweep.
(2) Spodoptera mauritia	1/sweep.
(3) Plant hoppers	5/ 15 sweep.
(4) Stem borer	3% dead heart.
(B) Initial tillering, 15 DAP (day after planting)	
1. Leaf folder	10% leaf damaged.
2. Case worm	10% leaf damaged.
3. White- back plant hopper	2/ hill.
(C) Active tillering, 30 DAP.	
(1) Stem borer	10% dead heart.
(2) Black rice bug	5 / hill.
(3) White- back plant hopper	5 adults / hill. 25 nymph / hill.

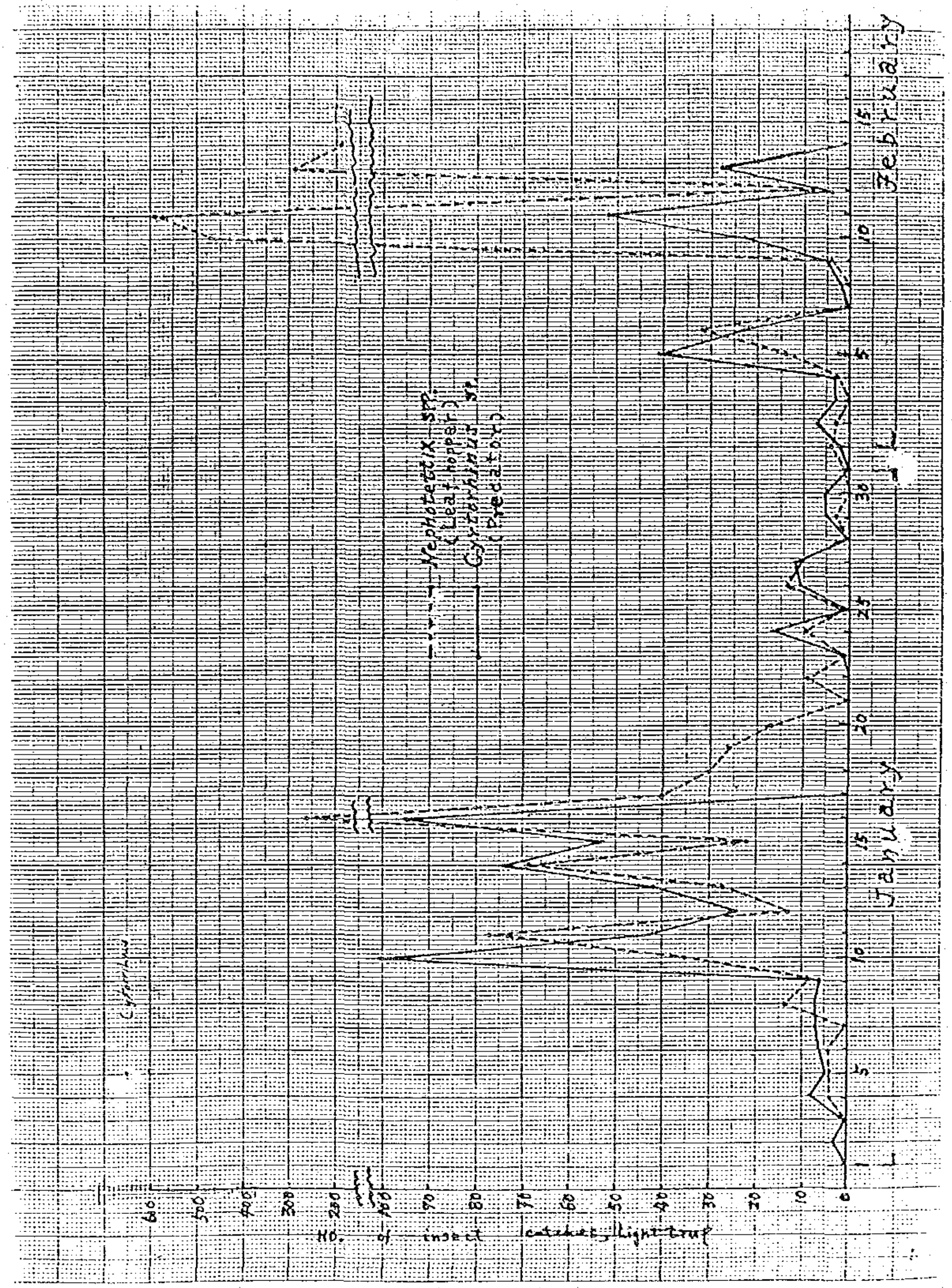
(D) Max tillering, 45 DAP .	
(1) Black rice bug	5/ hill.
(2) Stem borer	10 % dead heart.
(3) Brown plant hopper	7 adults / hill. 15 nymph / hill.
White - back plant hopper	7 adults / hill. 25 nymph / hill.
(4) Leaf - folder	10 % leaf damaged.
(E) Heading, 60 - 65 DAP	
(1) Brown plant hopper	7 adults./ hill. 5 nymph / hill.
(2) Leaf folder.	10 % leaf damaged.

(F) Flowering, 70 DAP	
(i) Brown plant hopper	20/hill.
(2) Leaf folder	10 % leaf damaged.
(G) Milky stage	
(1) Rice bug	2/hill.
(2) Green stink bug	
(3) Cletus sp. (bug)	

Appendix VI.

Light trap catches.





Nephotettix sp.
(Leaf hopper)
Gyrtorhinus sp.
(Predator)
No. of insect catches, light trap
January
February

Appendix VII

(Topic)

New method of Rat control with ''liquid nitrogen'' in Japan.

This method was accomplished last year (1983). The method is very simple and safe to use . Liquid nitrogen is pour into the rat hole at the rate of 300 - 500 cc/hole. Rat die soon after due to suffocation (lack of oxygen). The equipment required is a gas cylinder to store liquid nitrogen under high pressure. To operate this equipment the person must have a special license.

The advantages of this method are that it is safe to handle and more economical as compare to other methods of chemical control.

Methods of preparing Insect specimen.

I. Methods of insect collection.

Generally, insect collection can be divided into two types, i.e. general collection and collection for a specific purpose. The former is to collect specimen for the purpose of investigation or surveillance while the later is for study on insect ecology. For our purpose, description of general collection method is more appropriate.

A. Collection method and equipment.

1. Insect collection net.

There are many sizes and types of nets, but the most suitable and widely used are those with nylon mesh attached to a strong wire of diameter 30-40 cm and a handle of suitable length (1-1.5 m).

2. Sweeping method.

Usually, butterfly and dragonfly must be swept swiftly from the backside. The beetles on the leaf are swept from under to upper side, so that they will be caught unaware. The above sweeping method is effected after watching the insects, but we usually sweep the paddy field without watching the insects.

In the paddy fields, sweeping times for survey are usually 50 times and angle width of sweeping areas are calculated as equivalent to about $\frac{1}{3}$ are (app. 0.8 ac.)

Periodicaly field sweeping is being used to forecast insects occurence.

After sweeping, it is important to twist (turu) the net such that the insect are properly trapped, thus preventing them from escaping.

3. Insect collection tubes are used to suck small size or delicate insect from the collecting net.

Insect collecting tubes are constructed of three parts as shown in figure 1. (a) tube for collecting insect, (b) tube for receiving insect and (c) tube for sucking in insect.

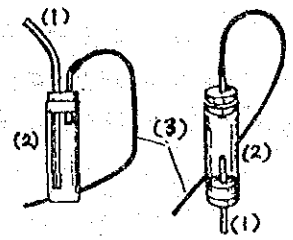


Fig. I. Insect collection tube.

(1) Insect collection tube.
(2) Insect receiving tube.
(3) Sucking tube.

The sucking tube is fitted with a wire mesh or gauze filter to prevent sucked insect from getting into mouth.

Insect collecting tube is used for direct catching of insect and so on.

4. Poison tube or bottle and poison usage.

Poison bottle (large size) or tube (small size) is necessary for use of killing insect for the purpose of specimen (figure 2).

The following three chemicals are usually used for killing the insect in the poison bottle or tube.

1) Potassium cyanide, natrium cyanide, Both chemicals are strong poison. The insects in the poison bottle or tube will immediately die upon exposure to CN gas.

Insects must be picked up as soon as they die, lest they be discolor or harden.

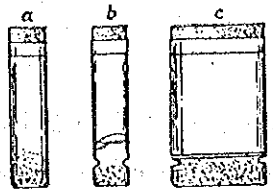


Fig. 2, Poison tube or pot.

2) Ethyl acetate or ether + Acetic acid (1:1)

This poison is not as strong as potassium cyanide. Insects do not die as fast, and the insect body will remain rather soft after dying, as such providing easy preparation of specimen. It is especially useful when making specimen of a Coleoptera.

3) Ammonia liquid.

Small Lepidoptera (moth), Diptera(flies, wasps, etc.) are usually killed by using this liquid. Insect killed does not become as hard, so that it can be easily prepared for specimen like using Ethyl acetate.

5. Triangle paper and triangle case.

Triangle papers are used to keep butterfly, moth, dragonfly etc. Triangle paper made from parafin paper is prepared by folding a rectangle paper as shown in figure 3.

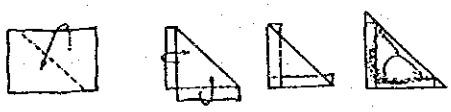


Fig. 3. Method of folding a Triangle paper.

A triangle case is used contain the triangle paper, poison tube and specimen.

Triangle paper is generally used to stock specimen after drying.

II. Specimen making method.

Insect specimen are divided into three types: dry specimen, liquid preserve specimen and prepared specimen.

A. Dry specimen and tools.

1. Insect binder (pin).

Insect binder is made of stainless steel, otherwise the binder may break due to rust. Binding have different sizes; the use depending on insect size.

2. Piercing spot for insect binder.

Insect binder is use according to the standard or general method of presenting specimen.

(1) From the body centre, pierce the spot a little to the right side as in figure 4.

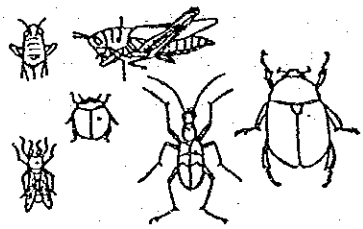


Fig. 4, Piercing spot of insect.

(2) To adjust the fixing level of insect body horizontally.
(3) To pierce on the insect weight center.
(4) To adjust the specimen on high level fixed by average stand.

3. Average stand.

Average stand is used to make insect specimen or insect name card uniformly. Shallow hole at the top is used to adjust the high level fixing of thick bodied insects.

4. Insect wing expand plate and method of using.

There are 4 plate sizes generally.

	Side plate width	Opening width	Length.
1	1.7 cm	0.5 cm	36 cm
2	2.5-3.0 cm	0.7 cm	''
3	4.0 cm	0.8 cm	''
4	7.0 cm	2.0 cm	''

(i) Methods of expanding insect wings.

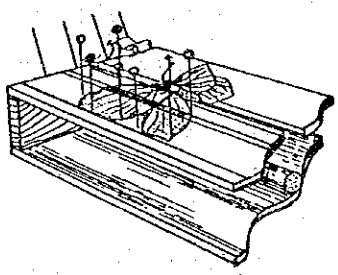


Fig. 5, Insect wing expand plate.

Insect pins are used to pierce at the thorax of the insect (winged), after the insect is set on the plate as in fig. 5. Hind edges of forewing is usually set at right angle to the insect body. Dried and stiff specimen is moisten in a container containing damp or moist sand.

5. Specimen of small insect.

For small or soft insect use microsize pin for body piercing. Microsize pins are about 1.5 - 2.0 cm in length. Piercing methods differ between different insect species. For Diptera and Lepidoptera, the specimen pierce from the upper side of the body but for Coleoptera and Hemiptera the piercing must be done from down side of the body. After the specimen is pierced with micro size pin it must set on another stage proper material (fig. 6).

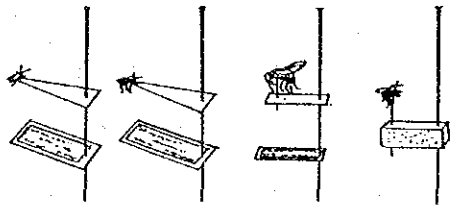


Fig. 6, Small insect specimen.

6. Labelling.

Label must include the place collected, Year, day and month collected and collecter's name.

7. Preservation of dry specimen.

Dry specimen is preserved in a wooden sample box. During preservation it is important to pay attention to mold and insect damages.

Paradichlolobenzene is effective against disease and insect damages.

B. Specimen soaked in liquid.

Many adult insects, eggs. larvae, pupa and gall etc. for information or morphological research are made by soaking in liquid.

1. Types of liquid.

a) Alcohol ($C_2 H_5 OH$)

50% - 70% alcohol is usually used for making specimen. For large specimen the alcohol is noramlly discarded after preliminary dipping to be replaced again with fresh alcohol so as to protect the alcohol content from decreasing.

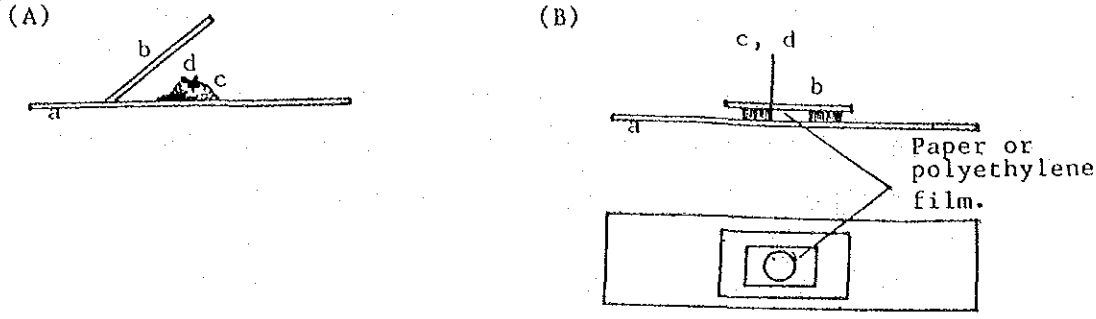
b) Formalin.

This is usually used for plant specimen injured by insect and aquatic insects but rarely used for insects.

2. Slide preparation.

Slide preparation is usually made for microscope study for morphology or identification of small and soft insect species. There are two kinds of permanent preparations, pne is Balsam type whose method is is complicated, the other is a simple type made from ready-made material such as Neo-Shigaral, (commercial name). In here, only simple type method is described. This method is easy to follow.

First, (A) fixing material or glue (Neo-Shigaral) is placed on the glass slide and the insects are put on it, after that covered by glass slide, or (B) First, put on a paper or polythylene film with a hole on the glass slide. (B) is a useful methods for thick body insect.



a) Glass slide.
b) Glass cover.
c) Fixing material.
d) Insect.

Fig. 7. Preparation.

Preparation is then able to be used under a microscope after three hours.

Preparation are stored in preparation box.

D. Specimens for Information use.

These are used to exhibit the ecological specimen, such as eggs, nymph, pupa, cocoon, adult, damaged plants, figure and table or photograph. (figure 8).

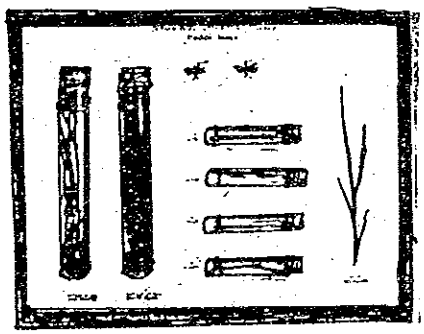


Fig. 8, Specimen for Information.

鈴木専門家現地レポート

（昆　虫　学）

―第２回　乾期作調査―

REPORTS

Project name	:	Water Management Training Programme in Malaysia.
Objectives	:	To prepare lecture notes and training materials on Insect pests and its control for rice cultivation and to study rice Insect pests in Kelantan.
Period	:	From June 27th. - 1984 to August, 26th. - 1984
Name	:	Tadao Suzuki

CONTENTS

Preface

As a short term expert on rice Entomology, I have completed two terms at NWMTC i.e. 23rd, Dc. 1983 - 19th. Feb. 1984 and 27th June - 26th Aug. 1984. I have gained some knowledge regarding the main season and off season insect occurrence and damages from light trap study, survey and survillance in the D/F field. I feel that insect damage can be very severe if left unchecked and proper insect control strategies are very important.

I summarized the results of my works in the next part of this report.

I wish to record my most sincere thanks to Ir. C.C. Chan, Director, for his kindness, I am grateful to Mr. NIK Aritt Sulaiman, Agronomist, for his good guidance, I wish to express my gratitude to Mr. Khor Kheng Wee, Senior agriculture assistant, for his good assistance. Also, I wish to express my thanks to all staff of NWMTC.

Finally, I wish to express my thanks to the Japanese team. Mr. Oguchi team leader, Mr. Shimada, Mr. Mtsuzawa, Mr. Watanabe and Mr. Kobayashi, Mr. Koyama, and Mr. Ushiyama for their help and encouragement.

I. Rice insects pests checked list for Kelantan, Malaysia.

	Species	Importance	Legend
I	ORTHOPTERA		- ... Sympton
	Oxya japonica Thunberg	-	+ ... little
II	HEMIPTERA		++ ... Medium
	Nilaparvata lugens Stal	+++	+++ ... Severe
	Sogatella furcifera Horvath	++	
	Nephotettix virescence Distant	+(++)Tungro	
	N. nigropictus Stal	-	
	N. parvus	-	
	N. malayanus	-	
	Recelia dorsalis Motschulsky	-	
	Scotinophora coaractata Fabricius	+++	
	Leptocorisa oratorius Fabricius	+++	
	Nezara viridula Linne	+	
	Celetus puntiger Dallas	-	
	Menida histrio Fabricus	-	
III	DIPTERA		
	Hyderillia philippina Ferino	+	
IV	LEPIDOPTERA		
	Tryporyza(Scirpophaga)incertulas Walker	++	
	Scirpophaga nivella Fabricius	-	
	S. gilviberbis Zeller	-	
	Chilo polychrysus Meyrik	++	
	Sesamia inferens Walker	+++	
	Daruara guttata	+	
	Melanitis leda Linne	-	
	Spodoptera mauritia Boisdural	-	
	S. litura	-	
	Pseudaletia inferens Walker	-	
	Nymphula fluctuosalis Zell)	+-++	
	Paraponyx sp.)		
	Cnaphalocrocis medinalis Guenee	++	
V	COLEOPTERA		
	Dicladispa armigera Olivier	+	

II. Analysis of correlation between light trap and rice field insect pests at D/F

Using a light trap to predict pest densities would make pest control operations simpler and more effective. Data obtained from the light traps at D/F were analyzed by using the "middle values of three days method" for easier understanding of the population dynamics.
Data of major insects were graphed on the figure number 1 - 15.
Each insect species compared in relation to both the wet season (January - February) and dry season (June - August).

Stemborers

There are mainly three species of stemborer in D/F field (Table 2-2). Generally field borer population densities are associated with light trap catches. Referring to Fig. 1, 2, catches Fig. 1 were very much higher than those in Fig. 2. The results indicated that stemborer damage during the dry season was more severe with as much as 36% dead heart recorded (Table 2-1). When compared to the wet season (where damage was negligible).
Generally, two generations of borer developed in one crop. The moth population usually peaks about 1 week after the egg density peaks in the field. Light trap catches cannot predict oviposition, but catch peaks of adult moths preceeded larval peaks. For maximum effectiveness, insecticides should be sprayed or broadcasted during a light trap catch peak, so that newly hatched larvae would be exposed or vulnable to the chemicals.

Leafhopper (Nephotettix spp.)

There are 4 species of leafhopper in D/F (Table 3). N. virescens is the dominant species, as it made up 81% of the total leadhopper population. Light trap catches fluctuate depending on the season (Fig. 3, 4). Dray season had a much higher population when compare to the wet season. Generally, the direct damage caused by the sucking action of the leafhopper is not as serious as compare to the indirect damage caused by viruliferous hopper which transmit the disease PMV (Tungro). Chemical control at the nursery and easly growth stage is necessary if a high population of viruliferous hopper is detected.

Planthoppers (Nilaparvata and Sogatella)

There are mainly two species of planthoppers in D/F. According to the species analysis of planthopper (Table 4), Nilaparvata lugens was more dominant than Sogatella furifera. N. lugens made up roughly about 80% of the total number of hopper caught. Hopper burn damage caused by N. lugens is more serious than that caused by S. furcifera.

According to IRR (Annual Report (1981), tropical population of planthoppers in tropical areas do not fly long distances. Major migration was associated with cropping pattern, other than climate.

Data from light trap catches at D/F seemed to be similar to the above-mentioned pattern (Fig. 5, 6). Light trap catches indicated high hopper population during the rainy season at around February (after heading stage) and during dry season was caught majority at around early June (active tillering stage). The reproduction of planthoppers normally coincide with the active tillering stage of rice and checks on light trap peaks must be made especially during the dry season. Also, survilance of the field is necessary for prediction of damage caused by the pest. Light rrap catches after heading are not so importance, as "Hopper burn" damage in cause mainly by bratinopterous type, which usually do not migrate.

Malayan black rice bug (Scotinophara coarctata)

Bugs were attracted to the light trap, especially during full moon. Large number of bugs were caught without diapause (Fig. 7, 8).

Correlation between light trap catches and field damage is not clear, but it gave some indications as to the damage that may occur whenever a high population is detected. Refer to my last report.

Rice leaf holder (Cnaphalorocis medinalis)

The number of moths caught was rather low during two crop seasons (Fig. 9, 10).

It occur mainly during the vegetative growth stage but sometimes also during the reproductive stages.

Recelia dorsalis

According to light trap catches, when number of hoppers caught was rather low compared to Nephotettix spp. (Fig. 11).

In case these hopper are found in padi areas infected by PMV it must be controlled as in the case of Nephotettix spp.

Other insect pests

Leptocorisa oratorius, Nezara virudura, Nymphula fluctuosalis are rather important insect pests. Catches not analyze.

Predators

According to light trap catches. Ophianea sp., Paederus sp., Cyrtorhinus sp., Micrapis sp., and Coccinella sp. were known to be attracted to light source, with Ophionea being highly attracted (Fig. 12, 13), and followed by Paederus (Fig. 11, 15). Ophionea sp. seems to be the most effective predator. Anyhow, natural enemies (Parasites and Predalars) seems to be in great abundance over here at the D/F.

Natural enemies must be encourage and conserve in the integreted pest management system.

III. Rice insect pests and natural enemies collection.

1. Malayan black rice bug and rice bug.
2. Stemborers. (3 species).
3. Rice caseworm and Rice leaf butterfly or Hormat.
4. Yellow rice stemborer.
5. Brown planthopper and green leafhopper.
6. Rice leafholder.
7. Predators and parasite.

IV. An approach to insect pest control methods at D/F field

According to field surveys, light trap catches and observations generally, the insect species were almost the same both in the main and off season.

But, the major insect species which damaged the crops differ in both croping seasons, i.e. the dominant species were Malayan black rice bug in the main season and Stempber during off season.

It is generally said that in the off season damage by planthoppers used to occur and degree of damages ranging from medium to severe have been recorded in 1981, '82 and '83. During this off season the population is rather low, but it still remain a potentially dangerous pests. Outbreaks of the insect pests occurred mainly during the vegetative grwoth stage of rice.

1) Vegetative stage

As a present strategy, chemical contro is very important to suppress the insect damages (i.e. tiller loss) at vegetative stage. At the vegetative stage of rice the important insect pest species may be ranked as follow, Malayan black rice bug = stemborer > planthopper and leafhopper > leafholder.

To control all these insect species (i.e. black bug, stemborer and leafhopper), carbofuran granule could be selected as one of the effective chemicals.

This chemical can be broadcasted as they are in granular form, and thus can minimized the harmful chemical effect on the natural enemies in the field. One of the recommended control method is to broadcast the Carbofran granules at the rate of 1 kg a.i./ha at 25 - 30 days after transplanting for prophylatic application.

The effective residual effect of Carbofran is estimated to last for about 30 days after its application.

2) Reproductive stage

The main insect pests at the reproductive stage of padi are the planthoppers and grain suking bugs. These pests can be suppressed by Carbofran chemicals at early stages. Increasing occurrence of planthoppers and bugs population can be detected/predicted by

light trap or field surveillance. BPMC chemicals is very effective for the control of both insects.

3) In the future, concepts of Integrated Pest Management must be introduced for more effective insect control measure.

Table 1. Survey of stemborer damage in the water depth-varietal trial at D/F. Panji

water depth cm	Total No. of tillers (A)	Total No. of dead heart (B)	% of damage (A/B)
30	146	42	28.8
20	115	46	40.0
10	106	29	27.4
5	105	26	24.8
5+0+5	145	39	26.9
5+0+5	83	25	30.1
0	94	21	22.3

Date of survey: 10 - 11/7/84

Total No. of hills examined per treatment: 5 hills.

Table 2-1. Varietal difference in relation to stemborer damage at D/F field.

Lot No.	Variety	Total No. of tillers (A)	Total No. of dead heart (B)	% of damage (A/B)
4	MR-71	243	120	49.3%
12-6	Anak Rimau	301	93	30.9
3	MR-77	295	117	30.7
10	MR-52	264	90	34.1
				(mean 36.5)

Date of survey: 5 - 10/7/84

Total No. of hills examined per lot: 10 hills

Table 2-2. Survey of species composition of the stemborer larval population at the D/F.

Lot No.	C.P.	T.I.	S.I.	New species (unidentified)	Total
	head	head	head	head	head
4	5	13	24	-	42
12-6	19	1	6	3	29
3	1	1	2	1	5
10	5	0	14	2	21
12-5	4	0	2	1	7
total	34	15	48	7	104
% species composition	32.7%	14.4%	46.2%	6.7%	

Note: C.P. ..... Chilo polychrysus

T.I. ..... Tryporyza incertulas

S.I. ..... Sesamia inferens

New species ..... Lepidoptera (unidentified)

Table 3. Species analysis of 100 adult male green leaf-hopper (Nephotettix spp.) caught by light trap (25-30/6/84)

Species	Numbers (%)	Numbers with black spot on wing	% with black spot on wing
N. virescens	81 (81)	35	43.2
N. nigropictus	13 (13)	13	100.0
N. malayanus	1 (1)	0	0.0
N. parvus	5 (5)	3	60.0

Table 4. Species analysis of planthoppers caught by light trap (1-8/7/84)

Species	numbers	% of species
Brown planthopper	205	80.4
White back planthopper	50	19.6
Total	255	

Table 5. Stemborer larva composition at heading stage to grain maturation stage

	T.I.	C.P.	S.I.	Total
Number of white head tillers	3	8	13	24
Number of the borers	4	20	52	76
% of borer species	5.3	26.3	68.4	

Note: T.I. ..... Tryporyza incertulas

C.P. ..... Chilo polychrysus

C.I. ..... Sesamia inferens

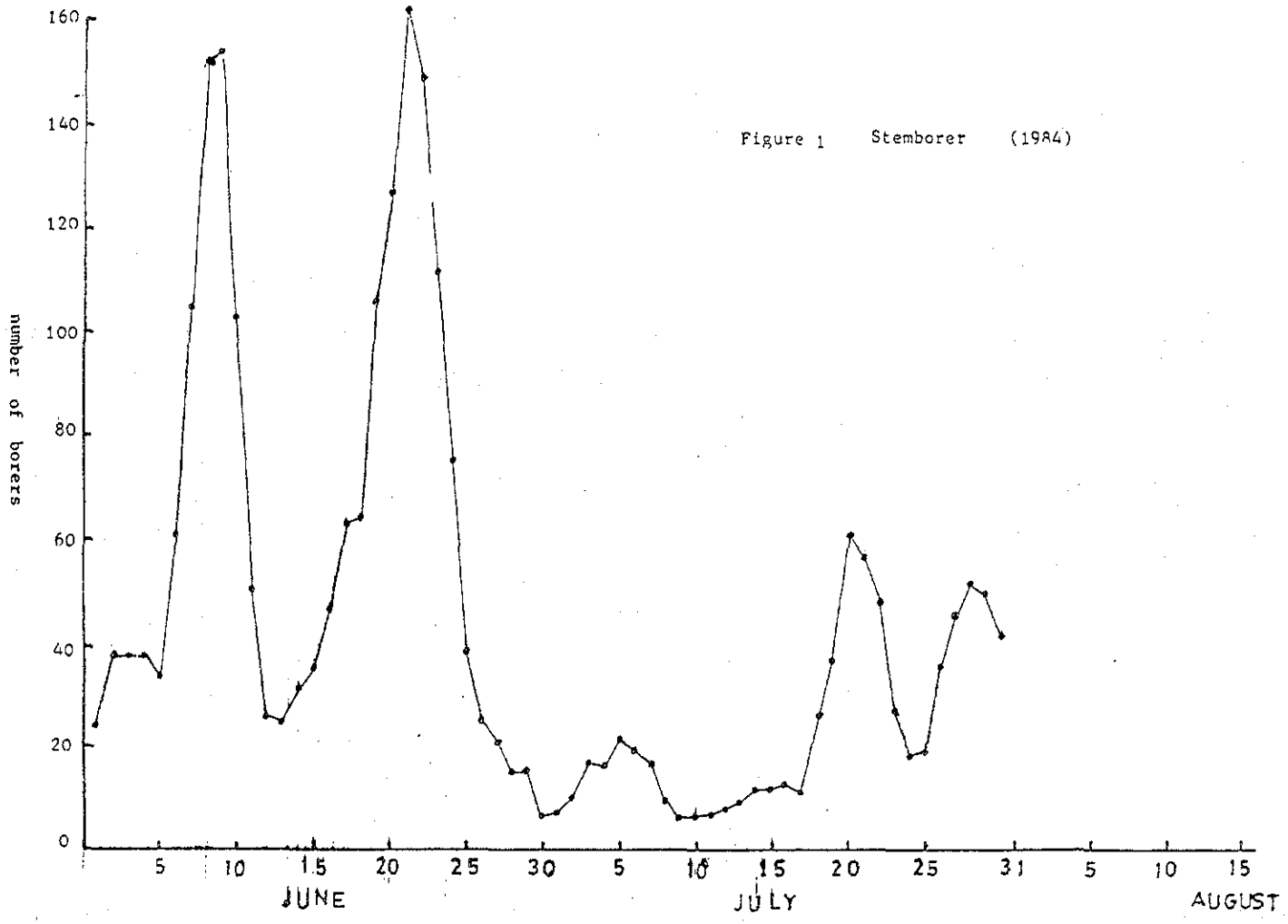


Figure 1 Stemborer (1984)

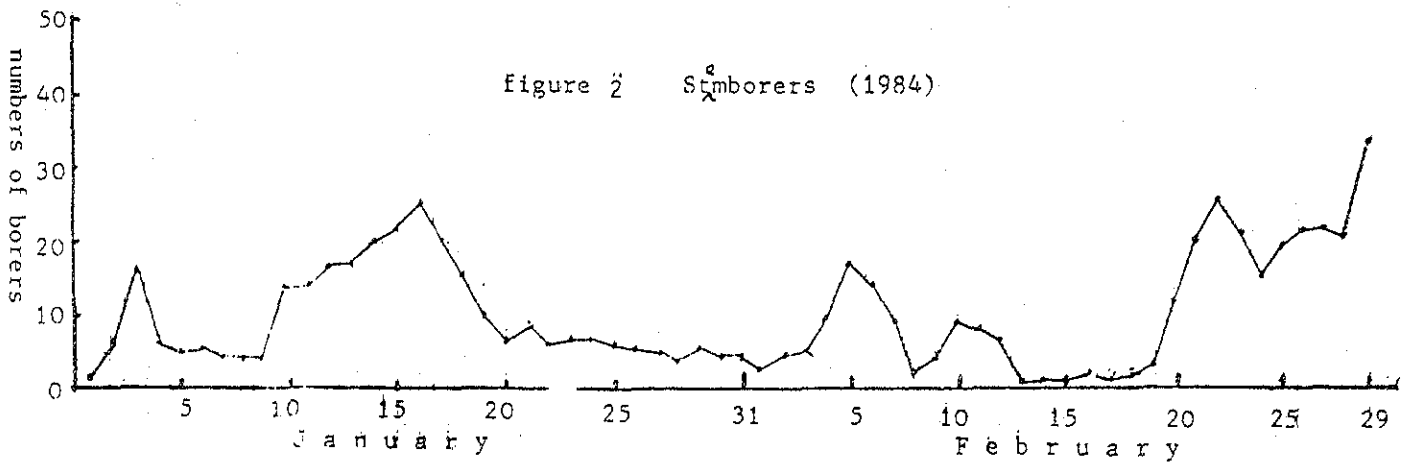


Figure 2 Stemborers (1984)

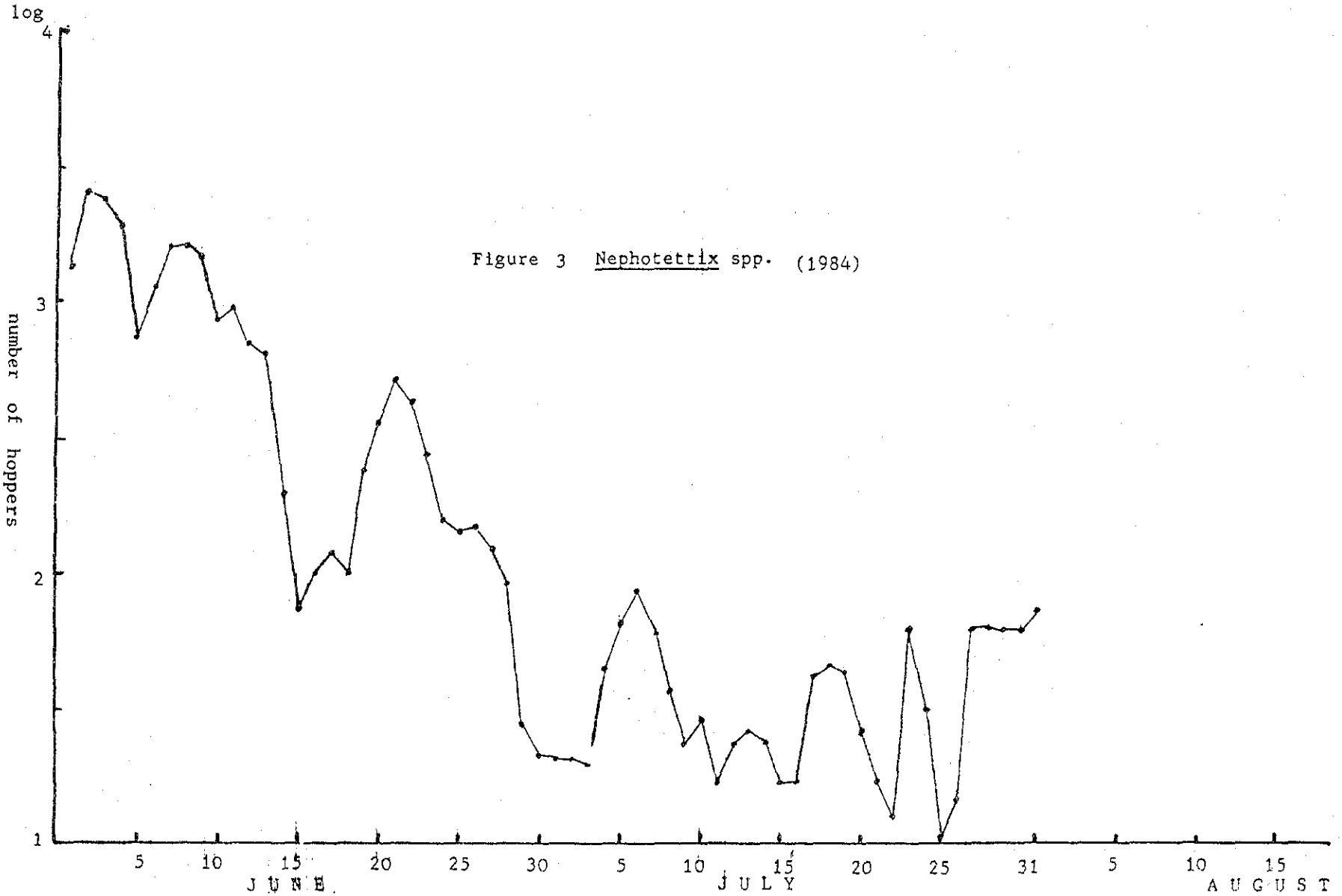


Figure 3 Nephotettix spp. (1984)

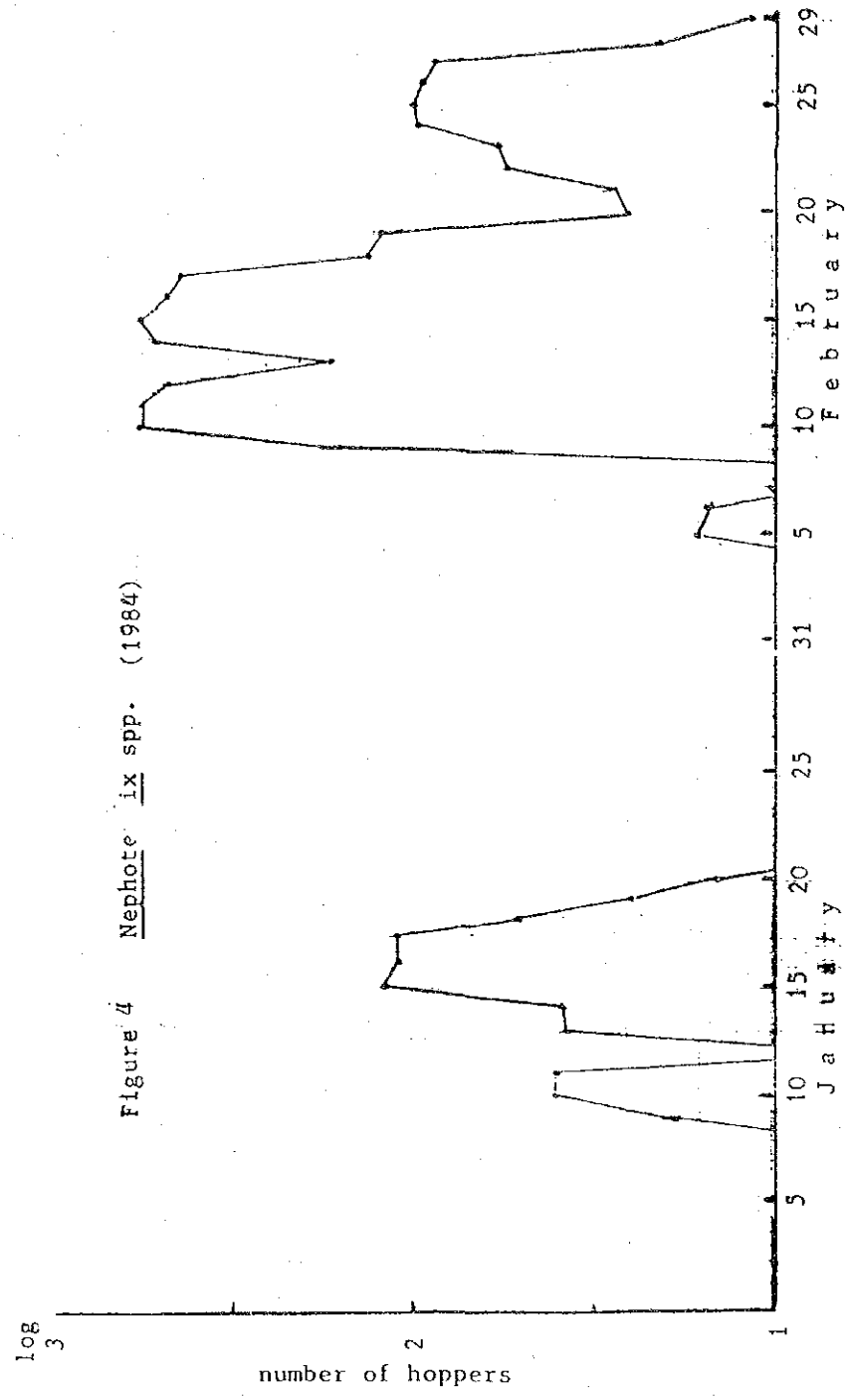


Figure 4 Nephotettix spp. (1984)

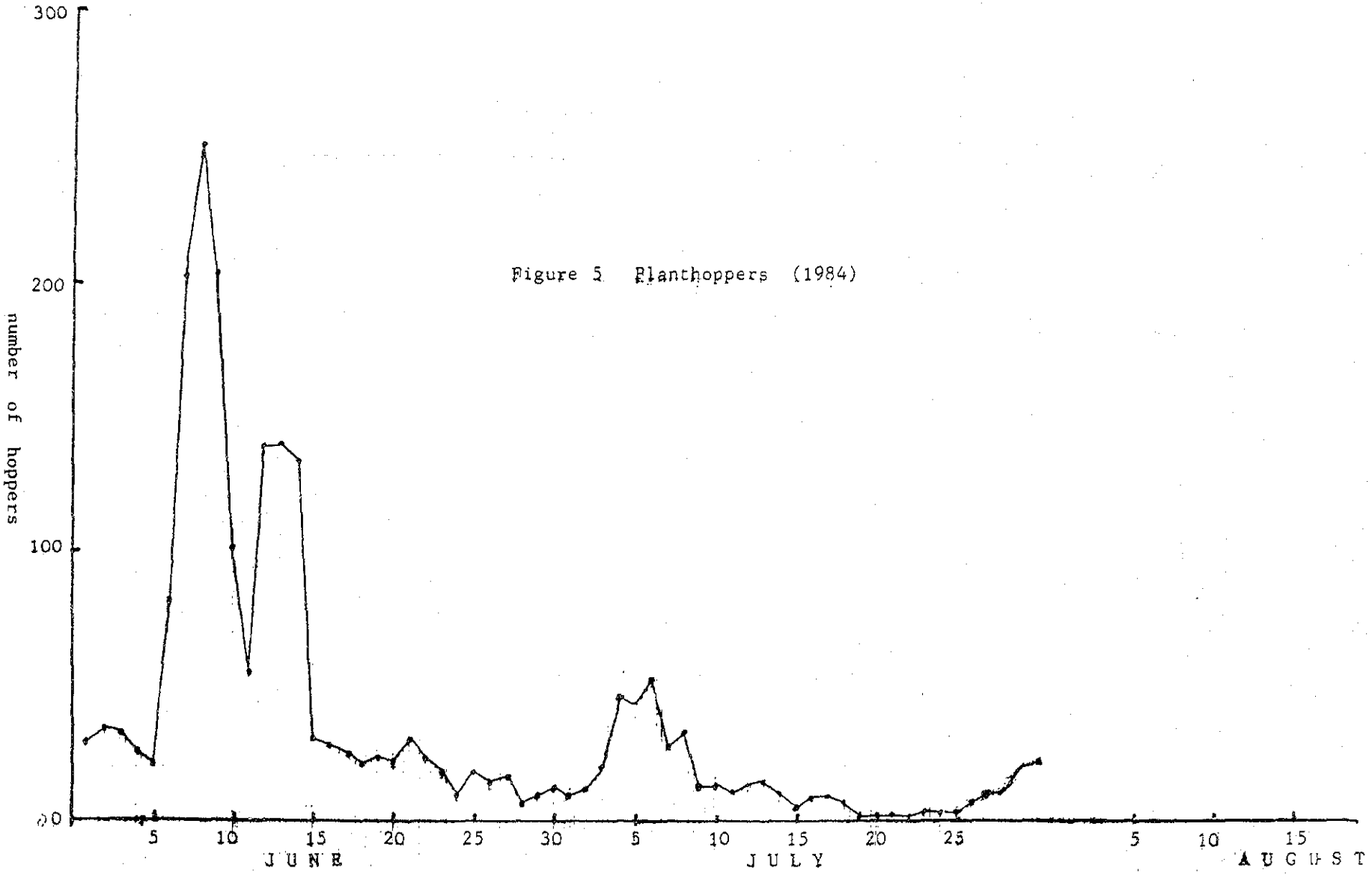


Figure 5 Planthoppers (1984)

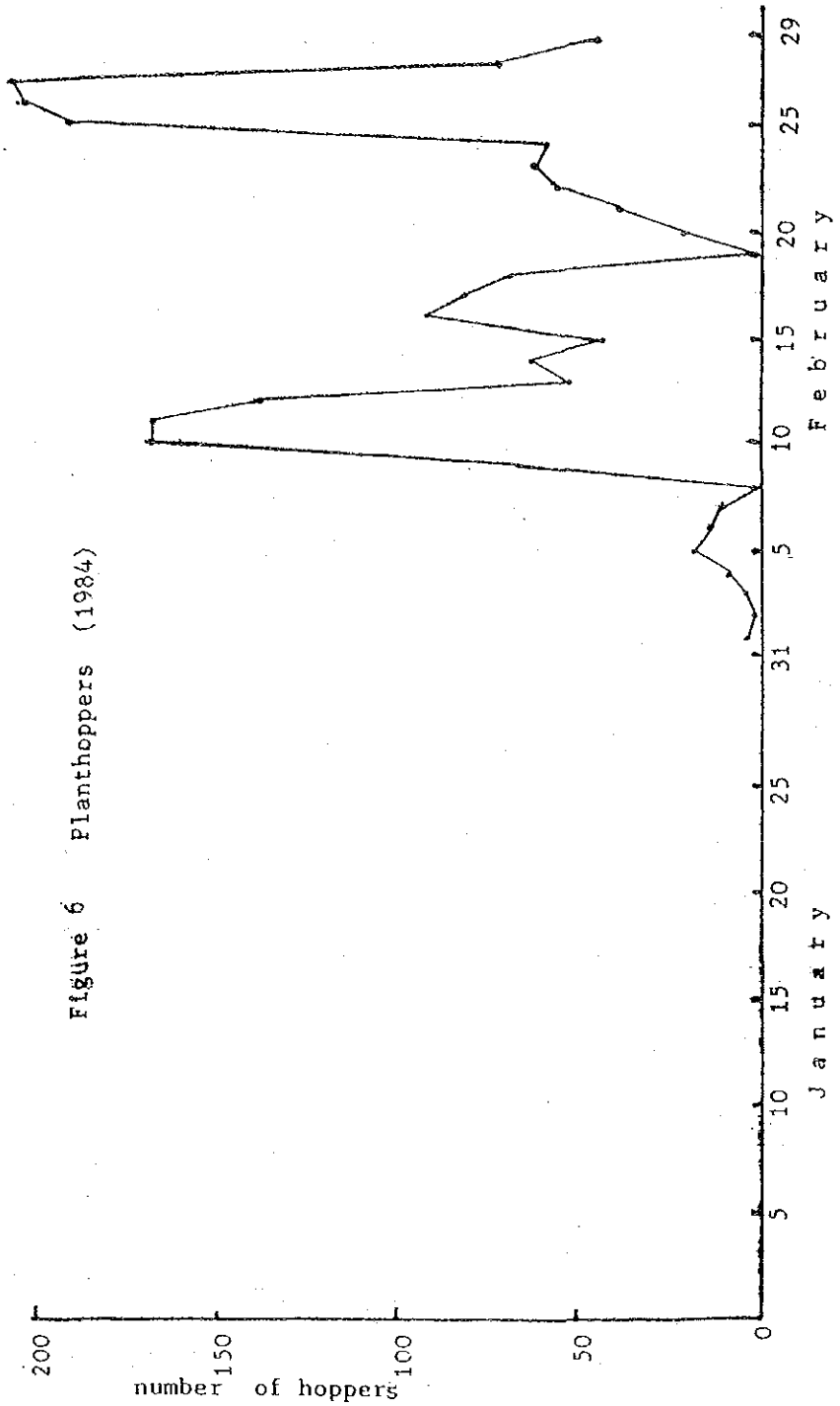


Figure 6 Planthoppers (1984)

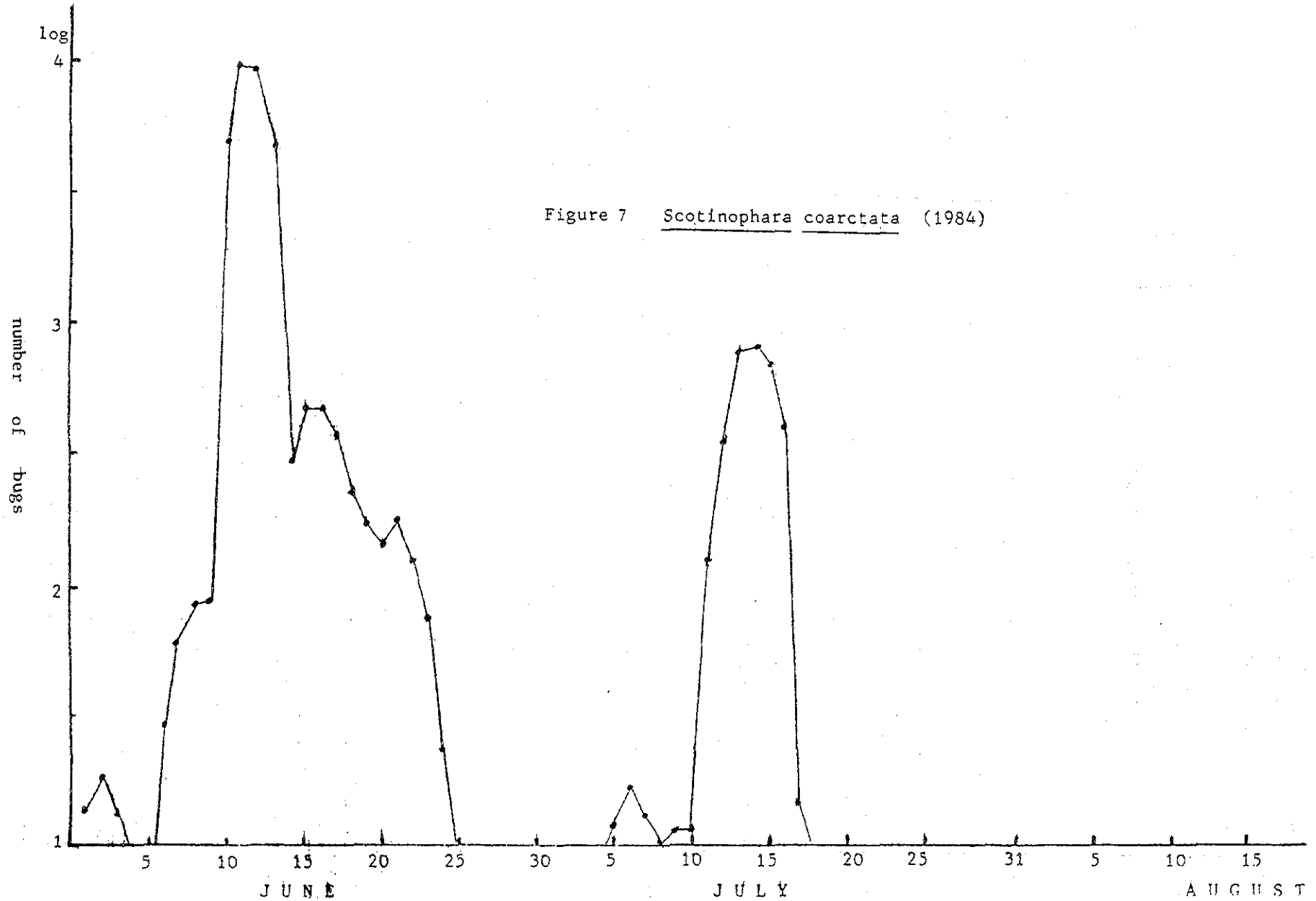


Figure 7 Scotinophara coarctata (1984)

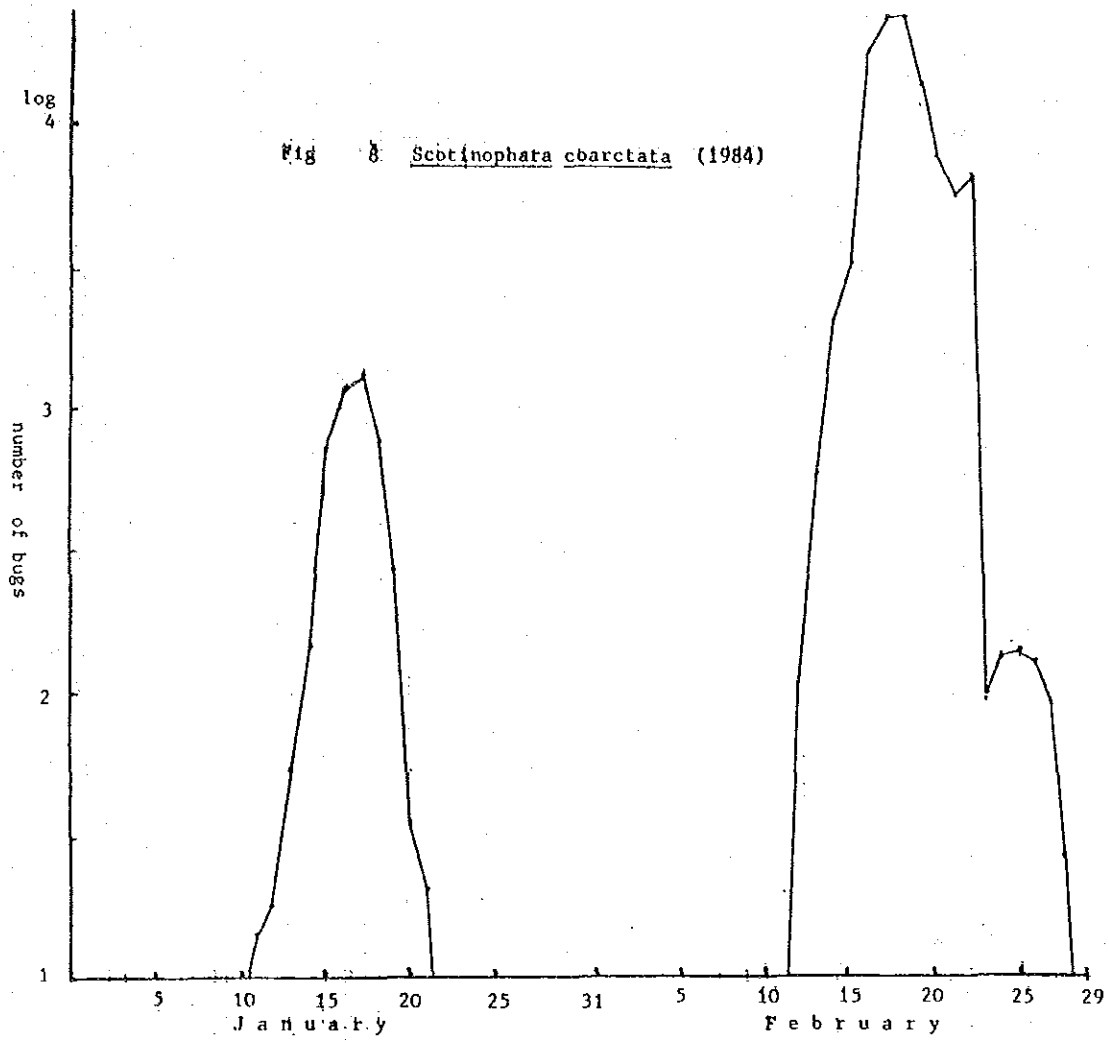


Fig 8 Scotinophara coarctata (1984)

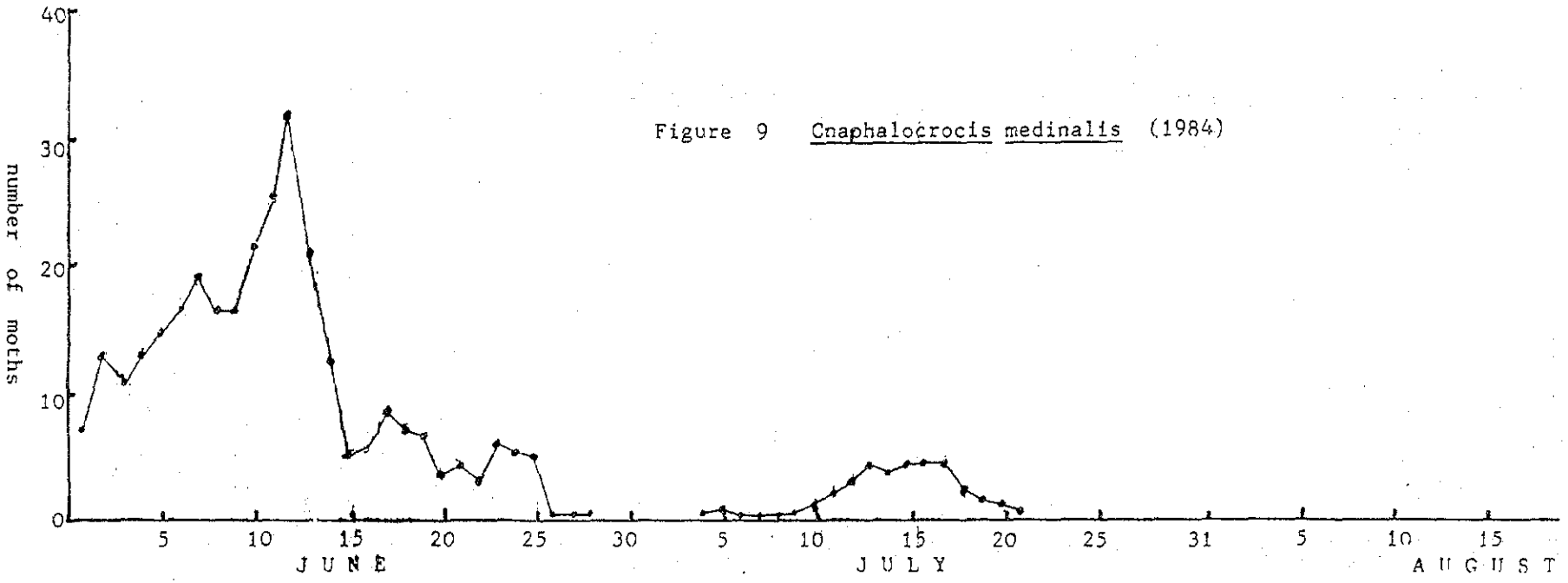


Figure 9 Cnaphalocrocis medinalis (1984)

Figure 10 Cnaphalocrocis medinalis (1984)

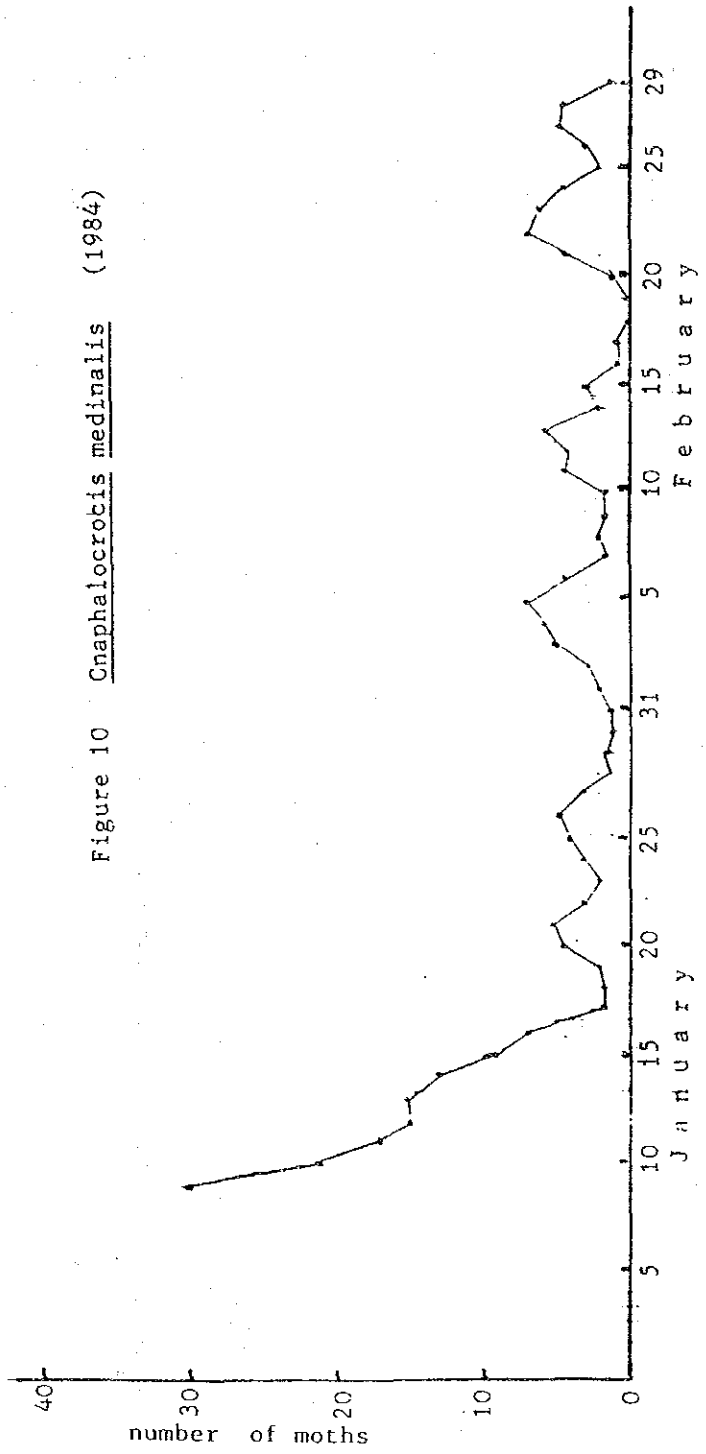
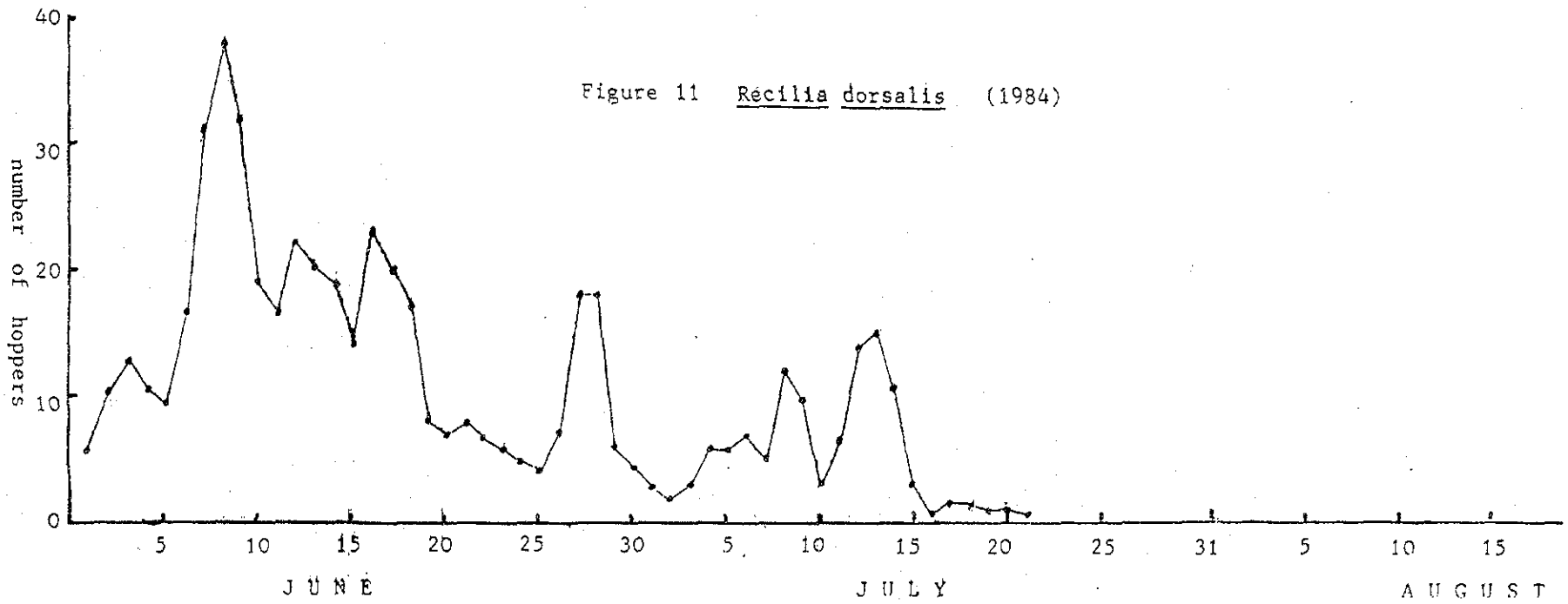


Figure 11 Récilia dorsalis (1984)



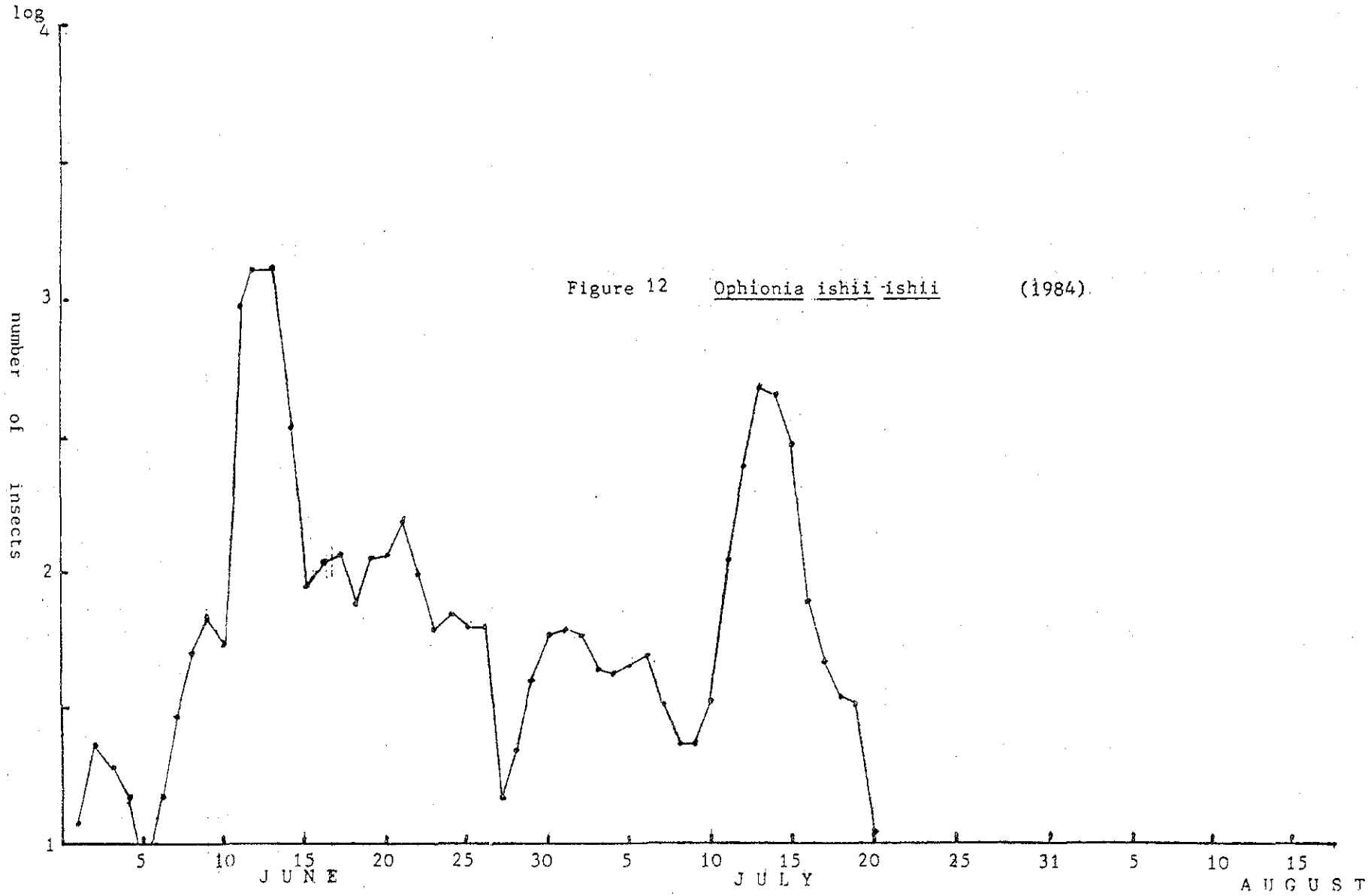


Figure 12 Ophionia ishii ishii (1984).

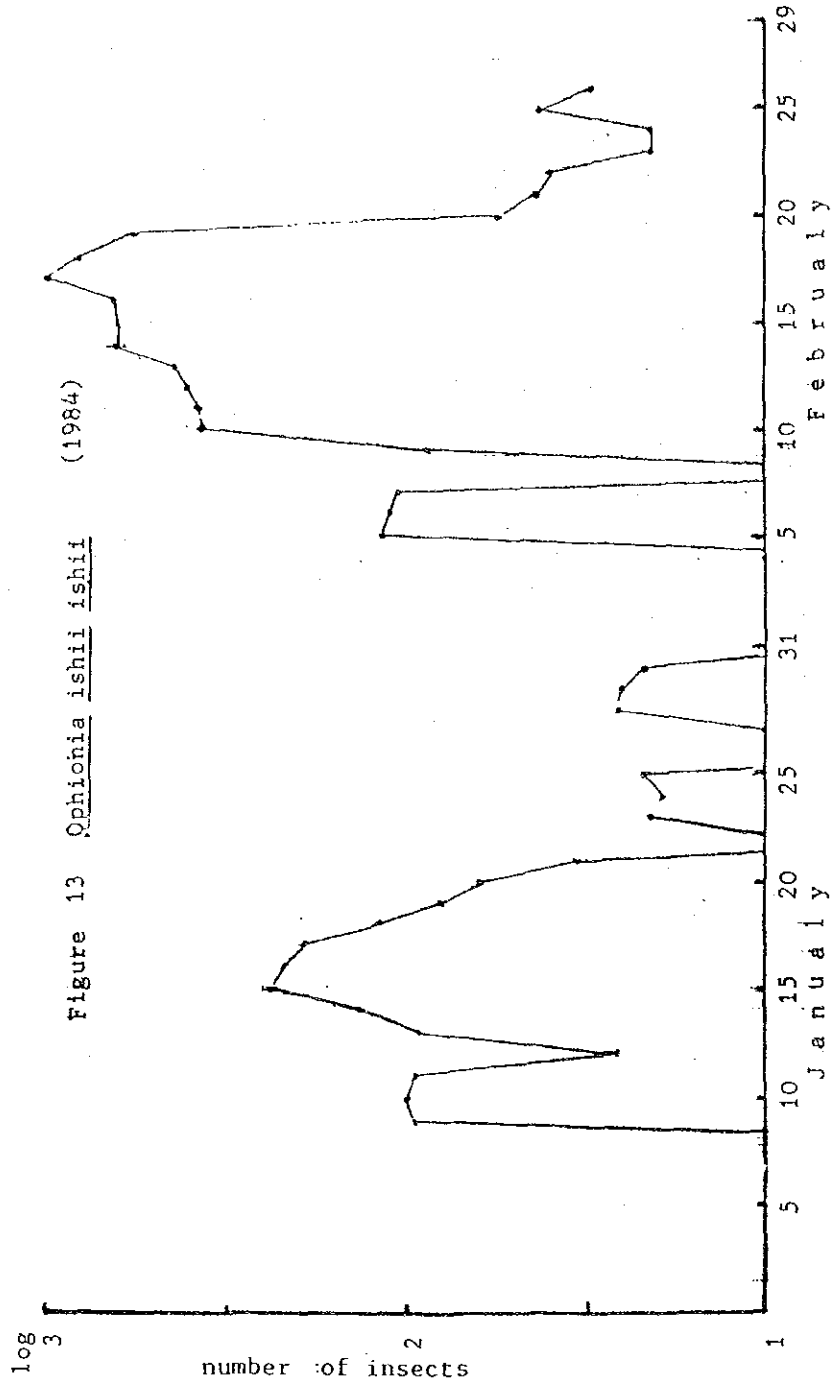


Figure 13 Ophionia ishii ishii (1984)

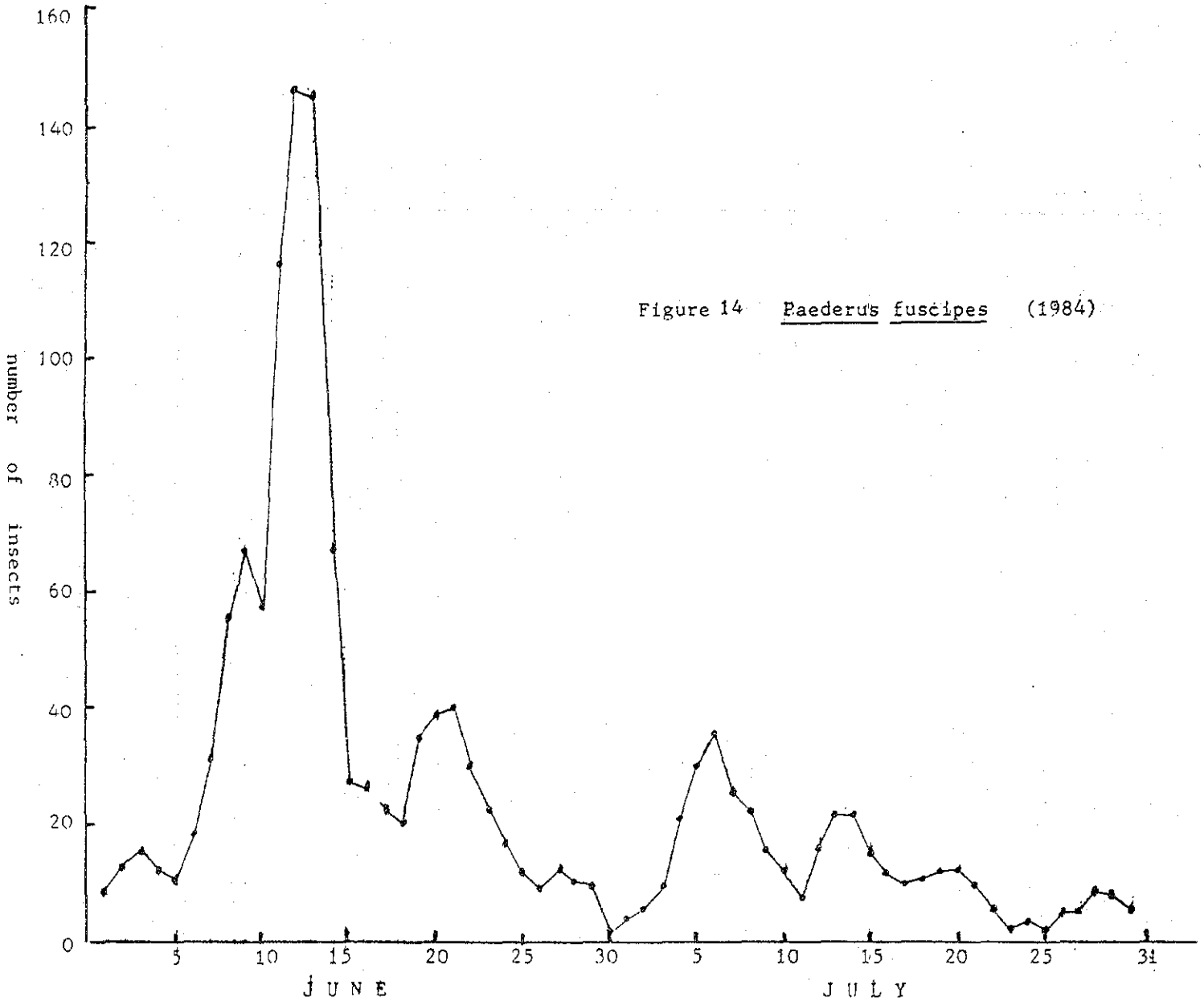
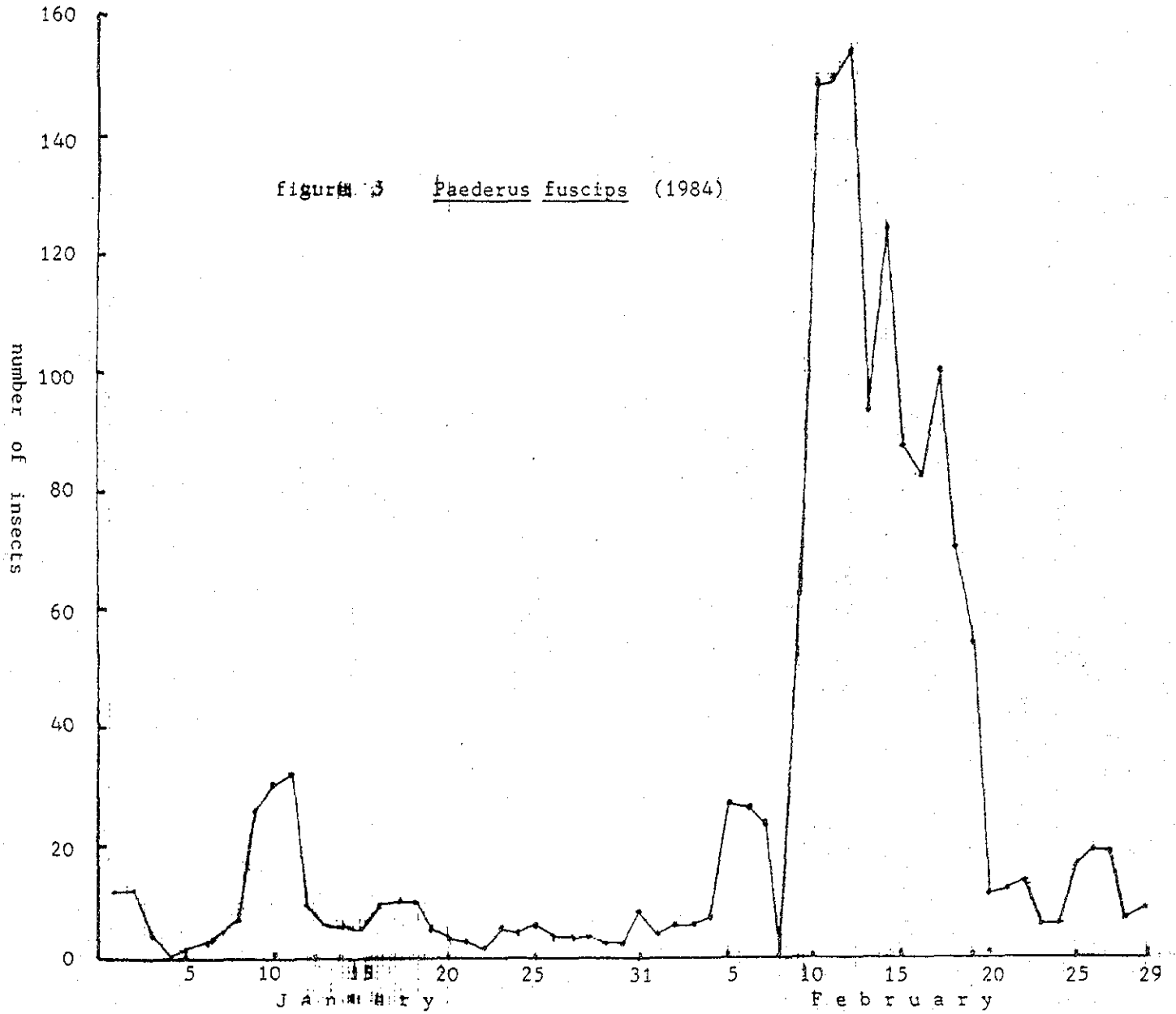


Figure 14 Paederus fuscipes (1984)

figure 3 *Paederus fuscips* (1984)



MARDIで指導されている害虫防除指針

Quote from
Bulletin Penyelidikan Padi
MARDI No. 35 (1985)

I. Guide for control measures in selection to the different crop growth stage.

Crop stage	Pest	T.E.T	Remark
A) Nursery or age of seedling 30 DAS	1. Nephotettix spp.	a) If mobile nursery indicate positive	a) Control of vector to present outbreak of PMV.
		b) Sweeps with insect net, T.E.T. 15/15 sweeps in outbreak area.	b) Spray area within 24 hours if results are positive. If possible raise water level in field to drawn the larve.
	2. Spodoptera mauritia	T.E.T: 1/hill	
	3. Nymphula	Random sampling of 20 hills. T.E.T: 10% damage	
	4. Sogatella furcifera	15 sweeps with insect net. T.E.T: 15/15 sweeps or 30/900 sq. cm.	
	5. Stemborer	Random sampling of 30 hills. T.E.T: 3% 'dead hearts'	
B) Initial Tillering (15 DAT or 30 DAS)	1. Cnaphalocrosis	Random sampling of 20 hills. T.E.T: 10% leaf damage	
	2. Nymphula spp.	- do -	
	3. Nephotettix	Random sampling of 20 hills. T.E.T: 5 adults/hill	
	4. Sogatella	- do -	

Crop stage	Pest	T.E.T	Remark
C) Active tillering (30 DAT or 45 DAS)	1. Stemborer	Random sampling of 20 hills. T.E.T:20% 'dead hearts'	
	2. Scotinophora coarctata	Random sampling of 20 hills. T.E.T: 5/hill.	
	3. Cnaphalocrosis	same as for (B)	
	4. Sogatella	Random sampling of 20 hills. T.E.T: 5/hill	
	5. Nilaparvata	- do -	
D) Maximum tillering (55-65 DAT or 70-80 DAS)	1. Cnaphalocrosis	Same as for B	
	2. Stemborer	Same as for C	
	3. Scotinophora	- do -	
	4. Nilaparvata	- do -	
E) Heading-flowering (75-85 DAT or 100-110 DAS)	1. Stemborer	Same as for C	
	2. Scotinophora	- do -	
	3. Cnaphalocrosis	Same as for B	
	4. Nilaparvata	Same as for D	
F) Maturation stage (milky stage) (85-95 DAT or 110-120 DAS)	1. Leptocorisa	Random sampling of area $1m^2$ T.E.T: $2/m^2$	
	2. Nezara		

DAT - days after transplanting

DAS - days after sowing (for direct seeding)

II. Guide to Insecticedes Usage

Insect Pests	Recommended Insecticides		Usage		
	active ingredient (a.i.)	Trade name	Method	Rate	Time
Stemborers					
a) Tryporyza incertulas	Carb furan	Furadan 2G	Broadcast	1 kg a.i/ha	30 & 60 DAT*
b) Chilo suppressalis	Endosulfan	Thiodan 5G	"	"	"
c) Chilo polychrysus	Qu lphos	Ekalux 5G	"	"	"
d) Sesamia inferens	Gamma BHC	Dol 6G	"	"	"
	Cartap	Padan 4G	"	"	"
Planthopper					
a) Nilaparvata lugens	BPMC	Bassa 50EC/ Hopsin 50EC Dust 2% Hopsin	Spray/Dust	0.1% a.i/ 1.5 kg a.i/ha	
b) Sogatella furcifera	MIPC	Mipcin 50WP	Spray	0.1% a.i.	
	MTMC	Tsumacide 96 W/W	"	0.1% a.i.	
	Propoxur	Unden 50 WP/ 1% Dust	Spray/Dust	0.1% a.i. 1.5 kg a.i./ha	
	MTMC + Elsan	Sogatox Dust 22	Dust	1.5 kg a.i/ha	

Insect Pests	Recommended Insecticides		Usage		
	active ingredient (a.i.)	Trade name	Method	Rate	Time
Leafhopper					
a) Nephotettix spp.	Carbofuran	Furadan 2G	Broadcast or incorporated in soil	1 kg a.i/ha	
	BPMC	Bassa 50EC/ Hopcin 50EC	Spray	0.1% a.i	
	MIPC	Mipcin 50WP	"	0.1% a.i.	
	Carbaryl	Sevin 85WP	"	0.1% a.i.	
Grains & stems sucking insects					
a) Leptocorisa sp.	BPMC	Bassa 50EC/ Hopcin 50EC	Spray	0.1% a.i.	
b) Nezara sp.	Fenthion	Lebaycid 50EC	Spray	0.1% a.i.	
	Gamma BHC	Lindane 20EC	"	0.1% a.i.	
	Azinphos-ethyl	Gusathion-A 22EC	"	0.1% a.i.	
c) Scotinophora coarctata	Endosulfan	Thiodan 35EC	Spray	0.1% a.i.	
	Carbofuran	Furadan 2G	Broadcast	1 kg a.i./ha	
	BPMC	Bassa, Hopcin	Spray	0.1% a.i.	
	MIPC	Mipcin 50WP	"	0.1% a.i.	
	Prop xur	Unden 50WP	"	0.1% a.i.	
	Fenthion	Lebaycid 50EC	"	0.1% a.i.	

Insect Pests	Recommended Insecticides		Usage		
	active ingredient (a.i.)	Trade name	Method	Rate	Time
Leaf feeders					
a) Cnaphalocrosis spp.	Acephate	Orthene 75WP	Spray	0.1% a.i.	10% leaf damage
	Lindane	Lindane 25EC	"	0.1% a.i.	Sprays affected areas within 24 hours after detection of pests.
b) Nymphula sp.	Fenvalerate	Sumicidin 30EC	Spray	0.1% a.i.	
	Carbaryl	Sevin 85WP	"	0.1% a.i.	
c) Spodoptera sp.					

* DAT: Days After Transplanting

小　林　専　門　家　報　告

（農業機械整備）

昭和 59 年 6 月 27 日 ～ 昭和 59 年 8 月 26 日

調　査　結　果　要　約

業務を終えて帰国したので下記のとおり報告します。関係各位の御高配により無事に終了出来たことを感謝し御礼申し上げます。

記

専門家氏名	小林博則
業務	農業機械整備
国	マレイシア
配属機関	農業省排水かんがい局
プロジェクト名	水管理訓練計画
期間	自　昭和59年6月27日
	至　昭和59年8月26日（2ケ月間）

1. 概　　要

現地からの当初の予定は3ケ月間に多様な機械の修理，指導等，広範囲にわたっていたようであるが，期間が二ケ月となった為に指導の時間が少なかった。

新らたに供与された機材の組立，故障していた機械修理，主要機種の点検整備を完了し，田植機一台を除いてすべて稼働出来る状態となった。

機械の使用利用，管理等の指導は一部しか出来なかった。

終了後検討報告会を行ない，英文の報告書と提言を提出した。その写しを提出します。（現地レポート参照）

2. カウンターパート及び要員

カウンターパート　Mr. Nik Ariff Sulaiman (Agronomist)

当センターの農業部門責任者で新規組立てに立会った。後半は時々見廻りに工場へ出た。

補助カウンターパート　Mr. Knor Kheng Wee (Senior Agricultur Assistant)

修理機械の順番を決めたり職員の監督に当り一日数回工場に出た。

要　員　1. Mr. Ruslam (Trocto Operoter)

当初から終り迄主体となって仕事に当った。修理経験はなかったが，良く役立ち技術も上達した。

2. Mr. Jusoh Daud (Tractor Operater)
新規組立てに3日間仕事を共にした。

修　理　工　Mr. Amron. Store and Work Shopの職員であり14日間手伝いに来た。技術も高く，良く役立った。

修理工助手　Mr. Harris. 助手として修理工に付いて来た。忠実で良く働いた。主要な修理が終って本務の任務にもどった。

ポンプ運転手　Mr. Kadir. 当場のポンプ運転手，ポンプ修理には助手として働らき，修理，手入れを修得した。

3. 業務実績

(1) 修理工場の整備

常勤専門家，修理工がない為工場は物置として使われていたので，その整備と工具類，電動具の据えつけ等を行ない修理工場として使えるようにした。

(2) 農機具の組立

新たに入手した農機具及び附属機材の組立てを行なった。7機種，10セットを行なった。

単独に組立て使用するものは全く問題がなかったが，新らたに供与された機材を何年か前に供与された機械に組付ける場合に若干の問題があった。特にあぜぬり機は加工をし仕様を変えて組立てた。

組立ての終った機械は必要により，テストを行ない使用方法の指導をした。

(3) 修　理

使用不可能となって修理を待っていたものを優先した。次に点検によって故障を見出したもの，滞在中に故障したものを修理した。

分解修理を必要としたものは特にエンジンが多かった。故障の内容は比較的軽いものが多く，修正，洗浄，調整等の処置を行ない，必要により部品の交換をした。

溶接等，機材を必要とし，当センターに設備のないものは排水かんがい局の工場へ依頼して行なった。

(4) 点検整備

トラクターは古いものから整備を行なった。又主要な機械の点検と整備は実施したが，整備を必要と思われる機械でも比較的新らしく，使用時間の少ないものはカウンターパート，オペレーターと相談の上行なわなかった。

(5) 管理及び使用指導

特に時間を費して指導する事が出来なかった。その都度気付いた事は伝えたが，充分ではない。

新規に組立てた機材は一応の説明をし，特にドッキングローダーはマニュアルを英文にして渡した。

4. ま と め

(1) 評 価（業務の）

部品を必要としている田植機一台を除いて修理は完了し初期の計画の大半は終った。

保守管理，使用等の指導は不充分であった。これは対象者も機種も多い為，多くの時間が必要であり止むを得なかった。

(2) 所 見（当センターの農機具についての）

所有農機具はあまり無理に使用したり，古くなっていない。又，特殊の部品を除き近くで入手出来るものがあり同系役所の工場も近くにあるので，比較的恵まれた条件を持っていると思われる。

早目の保守点検を心掛ければ，有効に長期間に亘り活用することが期待出来る。

(3) 提 言（現地への）

関係者と仕事を進め乍ら話し合った事項のうち書類に残した方が，今後仕事を進め易いと思われる事項につき取上げて提出した。

5. 今後の課題と対策

(1) マレイシア政府のとるべき対策

（マレーシア側へ報告書で提言した事項）

1) 精米機への附帯設備，バケットエレベーター，ホッパー，スタンド等
2) 廃油処理設備
3) 農機具利用の注意深い実行
4) 農機具保管中の適切な管理
5) 修理，管理用工具の拡充，整備

(2) 日本側が実行することが望ましい事項

1) 工具類の補充供与

（マレーシア政府へ提出した報告書参照）

総額 約33万円

2) 農機具部品，今後，数年間使用出来る量

部品の種類は報告書に記した今回使用したものと今迄に必要であったもの，及び消耗部品（FIRST MOVING PART）を中心とする。

(3) 以上を必要と思われるが，これらの効果を上げる為にマレイシア政府は農機具の専門家，又はそれに替り得る職員をセンターに配備することが望ましい。

又，日本側は必要により研修員の受入れと日本人専門家の短期派遣が望ましい。

小林専門家現地レポート

（農業機械整備）

August 22, 1984

REPORTS

Project Name	:	Water Management Training Programme in Malaysia.
Subject	:	Maintenance and repair services of farm machineries and teach necessary technics and knowledge to counterparts.
Period	:	From June 27, 1984 to August 26, 1984
Name	:	Hironori Kobayashi

First of all, I wish to express my most sincere thanks to all the staff of the N W M T C and to the experts of the Japanese Team who have made me feel very much encouraged and indebted to carry out my work here, and also thanks to Mr. Amurox and Mr. Harris, mechanic and his assistant from the store and workshop J P T , Panji, Kota Bharu for the troublesome work and contributed to be finish smoothly.

I worked here and had only enough time to finish the repair and maintenance of the machinery but not enough time to assist in teaching of utilization of machine.

This report contained all of my works during my stay here , which I had done myself or controlled and taught it to them, following annexed tables and figures.

The last page of this report was annexed with my recommendation and suggestion as follows;

Annex	1	Record of daily work carried out at center
Annex	2	Report of work
Annex	3	Parts supplied
Annex	4	Oil supplied
Annex	5	List of parts to be obtained
Annex	6	Recommendation/suggestions for N W M T C

Annex 1

Record Of Daily Work

Date	Description
Jun Wed. 27	Tokyo - K.L. - Kota Bharu
Jul Mon 2	Check & clean up the workshop.
Tue 3	Put in order inside of workshop, installed a vise.
Wed 4	Assemble Bottomplow and Diskharrow.
Thu 5	Repaired power sprayer. Adjust tyre tred of tractor.
Sat 7	Assemble docking loader and shelf for tool.
Sun 8	Assemble docking loader and shelf for spare part.
Mon 9	Test operating of docking loader. Assemble Drill Seeder .
Tue 10	Overhaul Diesel engine for water pump.
Wed 11	Overhaul water pump, Assemble self for attachment of machine.
Thu 12	Assemble shelf for attachment. Disassemble engine (Two-cycle) .
Sat 14	Disassemble mower 2 - set of pushing type, 2 - knap-sak type.
Sun 15	Assemble engine (Two - cycle). Assemble a mower knap - sak type.
Mon 16	Disassemble powertiller. Overhaul Rotary type mower.
Tue 17	Disassemble power tiller and engine. Assemble 2 set of mower pushing type.
Wed 18	Disassemble Rice transplanting machine. Check up parts.
Thu 19	Assemble T/planting machine, engine for power tiller and mower knap - sak type.

Jul	Sat 21	. Assemble P/tiller and engine. Installed Drilling Machine.
	Sun 22	Check up and adjust 3 - T/plowter, Assemble engine (2 - cycle)
	Mon 23	Assemble Dump trailler's hydraulic system. Disassemble Tractor's PTO .
	Tue 24	Assemble Tractor's PTO , check up spare parts for T/planter.
	Wed 25	Repair and service Reaper - thresher.
	Thu 26	Periodical service four wheel tractor. Instal_ l a se.
	Sat 28	Adjust water sprayer and tractor. Installed Electric grinder.
	Sun 29	Disassemble, clean up Rice - Mill. Assemble mower.
	Mon 30	Assemble Rice mill. Periodical service Tractor (4 wheel).
	Tue 31	Assemble 4 set of hose reel. Disassemble clutch of P/tiller.
Aug	Wed 1	Visit to Rice farm.
	Thu 2	Assemble clutch of P/tiller.
	Sat 4	Desk work
	Sun 5	Visit to Rubber plantation.
	Mon 6	Desk work
	Tue 7	Desk work, check up and adjust P/tiller.
	Wed 8	Disassemble mower, P/tiller.
	Thu 9	Fix "T " Pin to Trancher.
	Sat 11	Attend JICA expert meeting. Desk work.
	Sun 12	Weld, straighten machinery parts at store and workshop
	Mon 13	Repair knap-sak type mower.
	Tue 14	Disassemble power tiller.

Aug	Wed 15	Test operating of Batas R/p implement .
	Thu 16	Overhaul powertiller .
	Sat 18	Assembling powertiller.
	Sun 19	Assembling engine for powertiller.
	Mon 20	put in oder tool & parts washer
	Tue 21	visit to pilot farme number 3, store & warkshop
	Wed 22	Meeting final report (tentative)
	Thu 23	Kota Bharu - K.L.
	Fri 24	Report to JICA office.
	Sat 25	
	Sun 26	K.L. - Tokyo
	Mon 27	Report to JICA head office.

Report of work carried out at center

Item	Treatment	Replace/used	Status
I. Workshop Arrangement	(1) put in order		
	A) clean up workshop		
	?) Assembled equip-		
	ment shelf - 1		
	cart with shelf-2		
	(2) Installed		
	A) Vise - 2	Bolt 5 Washer 10	
	B) Grinder - 1	Bolt 2 Washer 4	
	C) Drilling Machine - 1	Bolt 4 Washer 12	
II. Assemble (newly arrived)	(1) Twin Bottomplow-SUGANO	attachment and set of parts	
	(2) Diskharrow - STAR	"	
	(3) Docking Loader	"	
	(4) Drill Seeder	"	
	(5) Dump Trailer	"	
	(6) Batas Repair/ plasterer im- plement	"	
	(7) Hose reel - sprayer - 4 units	8 x 40 m Hose	

Item	Treatment	Replace/used	Status
III. Machinery Service A. (4 - Wheel) Tractor			
(1) DJ 2025, Rusty PTO gear ISEKI - 2510 (553 hours used)	Overhauled, gear box, hydraulix system, replace parts, oil, water Adjusted, Regulated clean up radiator Air-cleaner.	2-packing oil seal Element Fuel Cartridge Engine oil Bolt, Engine oil 6.3 lit. Gear oil 16, Hydraulic oil 8.	condi-tion good
(2) DJ 2026 ISEKI - TS 2510 (484 hours used)	Periodic service	Element Fuel Cartridge Engine oil, Engine oil 6.2 liter Gear oil 16.	expec-ting parts 2 Bul 9 Fuse

Item	Treatment	Replace/used	Status
(3) DJ 5217 ISEKI - TS 2510 (435 hours used)	Periodic Service	Element Fuel Cartridge Engine oil, Engine oil 6.2 liter Gear oil 16.0	good condi-tion
B. MOWER			
(1) FLYMO - GL	(2) Two units overhaul		good
(2) EIFA FLAIL EHM - 63 EA	Overhaul Replace knife	knife 36 pieces	good
(3) ECHO RM - 200 E (knap sak type)	Engine trouble Overhaul engine, Replace engine head and piston ring	engine head Ass'y Piston Ring	good
(4) KAWASAKI (knap sak type)	clean adjust		

Item	Treatment	Replace/used	Status
C. Transplanting Machine			
(1) No. 2 PF 450	Rusty, lacking parts Overhauled, replace oil presser Ass'y etc.	26 item of parts	expecting 7 item of parts.
(2) No. 1, 3 and 4 PF 450	After/prior use:service check up engine, transmission clean up	2 spark plug	condition good
D. Power Tiller			
(1) No. 2 Engine GA 100-N (K 120)	Rusty by fallem in to water Overhauled Engine, Clutch.	Gasket head, Gasket head cover Ass'y Ring Piston Gasket gear Case Bearing ball - 3	condition good

Item	Treatment	Replace/used	Status
(2) No. 5 (engine) K 120	For assembling of attachment of Batas repair/ plasterer implement. Cut shaft (3) short and belt cover to be adjusted and assembled.	a set of the attachment and parts	To be test operating
E. Harvester ISEKI - HM 71	service, after/prior use clean, check up adjusted	Diesel oil, Gasoline for clean up	expecting parts
F. POWER SPRAYER MARUYAMA - MS 353	Engine have no compression - valve stauk overhauled	engine oil 2 liter	good
G. Trencher EARTH MAN	service, periodic check up clean, adjusted	Diesel oil Gasoline for clean up	expecting 12-"T" pin

Item	Treatment	Replace/used	Status
H. Water pump (1) YAMAHA - 2 inch	Engine have no compression - valve stauk overhaul	Engine oil 2 liter	good
(2) KUBOTA (pump - O)	Diesel engine, no compression overhaul	Engine oil 2 liter	good
(3) KUBOTA (pump - KATO)	pump cannot self priming overhaul	Engine oil 2 liter	good
I. COMPACTOR MEIWA (engine ROBIN)	check up, clean up adjusted		good
J. Rice Mill KANEKO	clean up adjusted Attached Husk exhaust duct, repaired cyclone etc.		expecting the wire connect

Parts Supplied (1)

Part No.	Name of parts	Q'ty	Remarks
Transplanter	PF 450		
2110-101-0030-0	Packing gear box	1	SB4-172
2110-101-0022-0	Box gear (R)	1	SB4-172
2110-123-0010-0	Sprocket (11T) wheel drive	1	SB4-172
2110-123-2101-1	Wheel chain case	1	SB4-173
2120-123-0020-0	Kei sprocket	1	SB4-172
2110-217-2000-1	Oil pressure ass'y	1	SB4-173
V201-260-6020-0	Bolt	2	SB4-174
V201-260-6016-0	Bolt	4	SB4-174
V401-160-0060-0	Washer. SP/M6	8	SB4-174
2723-305-0010-1	Link side float	2	SB4-175
2710-303-0061-0	Rod Marker	2	SB4-175
2710-303-0070-0	Marker	2	SB4-175
2110-370-0010-0	Bolt Marker	2	SB4-175
3511-201-0201-0	Spring Holder SM	2	SB4-175
V300-260-0060-0	Nut M6	8	SB4-175
2710-303-2000-0	Bracket (Front)	1	SB4-176
2710-303-3000-0	Bracket (Front)	1	SB4-176
2796-305-0040-0	Linkside float	2	SB4-176
2796-305-0010-0	Float L.H. Side	1	
2796-305-0020-0	Float R.H. Side	1	
V740-125-3808-0	Seal Oil	1	TC253808

Part No.	Name of parts	Q'ty	Remarks
5612-384-1006-0	Plug spark	1	NGK B6S
0710-303-0041-0	Pin float set	3	
3207-102-0130-0	Washer	4	
V500-152-0010-0	Pin cotter	2	
V500-153-0020-0	Pin cotter	1	

Parts Supplied (2)

Part No.	Name of parts	Q'ty	Remark
Diesel Engine	GA 100 - N - KUBOTA	1	
14681-0331-3	Gasket head	1	
14681-1452-1	Gasket head cover	1	
14681-2105-1	Ass'y Ring Piston	1	
14681-0413-0	Gasket gear case	1	
14301-7419-2	Bearing ball	2	
14301-0000-4	Bearing ball	1	
15231-4356-0	A'ssy Element Fuel	1	
Power Tiller No.5	K120 - KUBOTA		
53891-1118-0	Packing, S cover RH	1	
63763-1113-0	Packing, S Cover LH	1	
63891-1115-0	Packing	1	
63763-1135-0	Packing rear cover	1	
63891-6601-0	Release Ass'y engine	1	
63763-1366-1	Packing pulley cover	1	
63611-1315-2	Seal	1	

Part No.	Name of parts	Q'ty	Remark
Tractor (4-wheel)	Ts 2510 - ISEKI		
1415-501-0020-0	Packing cylinder case	2	DJ 2025
V74413-55508	Oil Seal	1	DJ 2025
2798-401-0040-0	Bolt	1	DJ 2025
1415-102-0110-0	Element Fuel	3	DJ 2025, 2026, 5217
5691324-08040	Cartridge Engine Oil	3	DJ 2025, 2026, 5217
	Fuse (10A)	6	DJ 2026
Diesel engine	GA 100 - N, KUBOTA		
15231-43560	A'ssy Element Fuel	1	

Annex 4

Oil Supply

Date	Supply to	For	Q'ty	Remarks
(Hydraulics Oil)			liter	
July 24	DJ 2025 ISEKI TS 2510	Replace	8	
July 8	DJ 2023 "	Docking loader	4	
July 23	DJ 2024 "	Dump trailer	2	
(Gear Oil)				
July 24	DJ 2025 ISEKI TS 2510	Replace	16	
July 26	DJ 2026 "	"	16	
July 28	DJ 5217 "	"	16	
(Engine Oil)				
June 14	Power sprayer MS 353	Replaced	2	
July 24	DJ 2025 ISEKI TS 2510	Replace	6.4	
26	DJ 2026 "	"	6.4	
28	DJ 5217 "	"	6.4	
June 14	KUBOTA Pump 2 unit	"	4	
14	YAMAHA Water pump	"	2	

List Of Parts To Be Obtained

Name of Machine	Parts No.	Name of parts	Q'ty Required
Transplanter ISEKI PF 450	2796-304-0030-0	Bracket rear float fixing	2
	2710-303-0041-0	Pin float set	6
	1305-241-0010-0	Pin hair	2
	2706-101-0130-0	Cap sprocket	1
	2704-102-0090-1	Plug wheel chain case lubrication	1
	5613-665-1802-0	Gasket (for Fuel filter)	1
Tractor (4 wheel) ISEKI TS 2510	(NJ 2026)		
	1407-621-0080-0	Bulb (12V - 3W)	2
	1415-621-0100-0	Bult (6V - 3W)	1

RECOMMENDATION/SUGGESTIONS FOR N W M T C

1. Required feeding facilitate for rice mill refer annex Table 1 .

   (1) Bucket elevater

   (2) Paddy hopper for elevater

   (3) Stand for paddy bag

2. Prevent water/soil contamination from oil

   (1) Keep the used/waste oil in container

   Do not dump it on to field

   (2) Construction a structure for purifying oily water, annexed to workshop and washing bay.

3. Anxiety of operating

   (1) Check up quantity and quality of engine, gear and hydraulic oil.

   (2) Periodically oil change and record it.

   (3) Warming up the engine before use.

   (4) Avoid suddenly starting and stopping.

   (5) Specially care in breaking time.

4. Treatment of Storage

(1) If the engine not expected to use long time, give little engine oil in to combustion - chamber from spark plug's hole and turn the engine by hand, to prevent from rusting of chamber and valves.

(2) Each engine needed to dry-operating to oil lubrication before and after rainy- ason

5. Required tools for work shop

Annexed Table 1

Hironori Kobayashi

August 22, 1984

Agricultural Machinery Expert

Figur 1

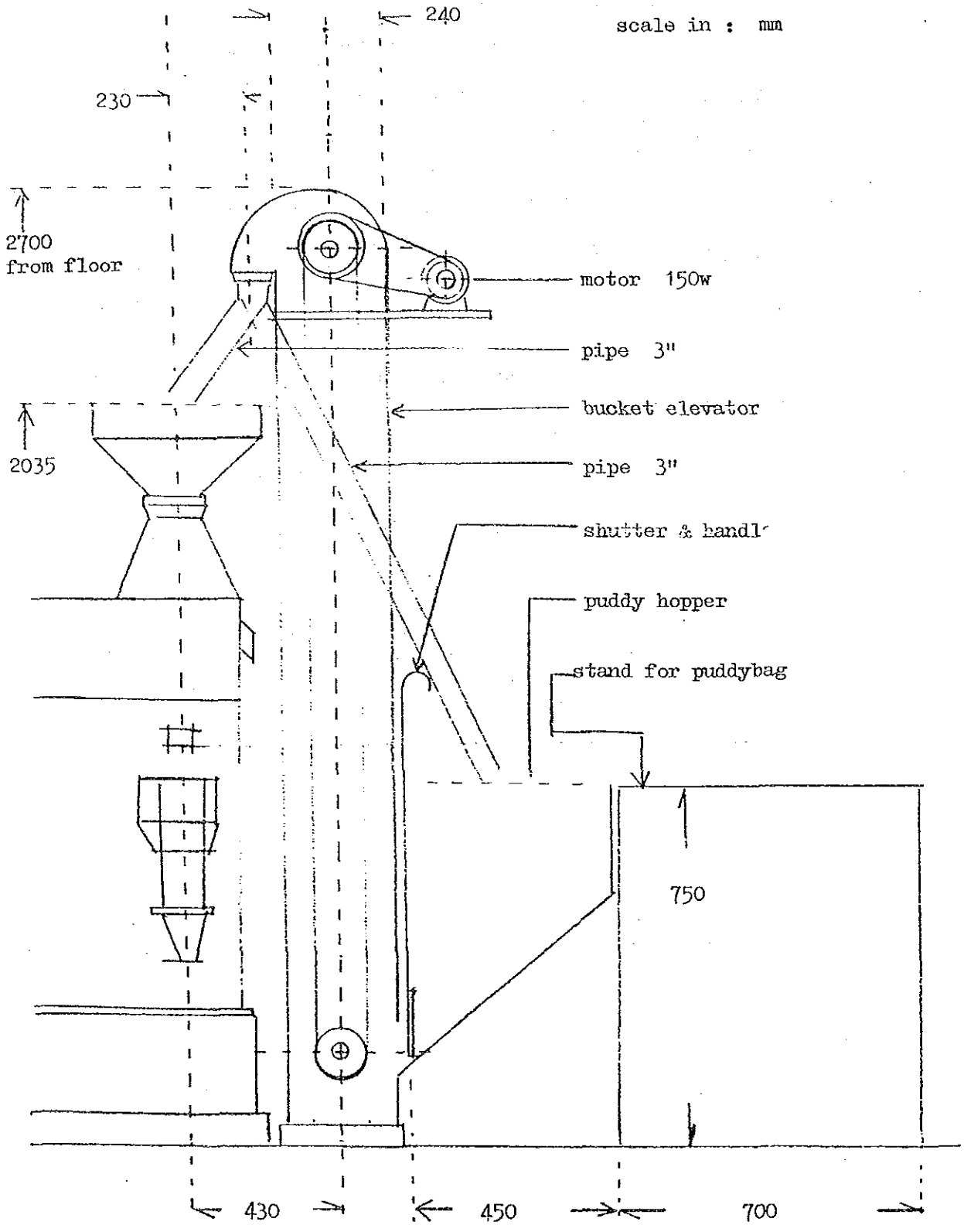

240
scale in : mm
230
2700
from floor
motor 150w
pipe 3"
bucket elevator
2035
pipe 3"
shutter & handl
puddy hopper
stand for puddybag
750
430
450
700

Table 1

LIST OF TOOL

Required for work shop

Name	Description	Price approx @ ¥	Q'ty
Piston ring plier	Three different size	700	1 set
Cutting plier	160 mm	1,500	1
File	300 mm, round, half round, flat, triangle	2,200	2 set
Pipe wrench	300, 400, 500 mm	4,300	2 set
Grip plier	200 mm	3,300	2
Snap ring plier	160 mm outer, inner	1,500	1 set
Screw extractor		12,000	1 set
compressing gauge	20 kg/cm 3	12,600	1
Nozzle tester		29,000	1
Bearing puller	set	55,800	1
Scraper	250 mm, 300 mm	1,900	4 set
Hand tachometer	Digital (optical reflection)	15,150	1
Moisture meter	Digital (for post harvest)	26,000	1
ARC Welder	Input 6 KVA Range 35-115A 240V		
	Object of Material Thickness up to 4.5 mm with outfit, accessory welding rod 2.0 ϕ mm 2.6 ϕ mm	110,000	1 1 box each
Bridge steel	1,500 kg Durability	25,000	1
	500 kg "	15,000	1
	Total	¥331,850	

Work Plan on Agricultural Machinery

1. Subject : Maintenance & repair of Agricultural Machinery with short note.

2. Period : 27.6.84 - 26.8.84

3. Working Place : N W M T C

4. Expert : Mr. H. Kobayashi

5. Counterpart : Mr. Nik Ariff
: Mr. Khor Kheng Wee (sub)

6. Assistant Staff : Mr. Shamsuddin (Junior Technician)
: Mr. Ruslam (Tractor operator)
: Mr. Jusoh Daud (Tractor operator)

7. Corporate Advisor : Mr. T. Shimada

8. Details of Work
   (1) Check up each machinery.
   (2) Clean up and put in order the workshop.
   (3) Set up the tool.
   (4) Assembling of machinery and tool.
   (5) Maintenance, adjusting and regulation of machine.
   (6) Overhaul of machinery
   (7) Test operating.
   (8) Check and list up of spare part.

9. Object of Machinery

(1) 4 wheel tractor, 6 of ISEKI TS 2510, 1 of ISEKI TS 3110

(2) Attachment of above, Rotary, paddling harrow, trailer, rear grader, docking loader.

(3) Power tiller, 5 of KUBOTA K120 with attachment.

(4) Transplanter 4 of ISEKI PF 450, 2 of YANMAR YP 400, 1 of YANMAR YP 400 .

(5) Seeding Plant, Mixer, Soil Feeder, Planter, Covering device .

(6) Combined Harvester, 2 of ISEKI HD 3100, 1 of HC 1300 , 1 of YANMAR TC 3500 MW

(7) Movable thresher, 1 of ISEKI HE 7110

(8) Mist/Dust Blower, 5 of MARUYAMA MD-150, 2 of ARIMITSU HD-350

(9) Power Sprayer, 3 of MS-353E

(10) Mower, 1 of ERTA EHM, 2 of ELYIO, 4 of Knapsak, 1 of tow system.

(11) Dryer, 1 of KANEKO SH-235SR

(12) Ventilating Bin, 2 of KANEKO RFT 260 B

(13) One pass type Rice milling, 1 of KANEKO KRM 500

(14) Power carrier, 1 of SHIKOKU X - 60

(15) Seeding machine

10. Conclusion : Short note.

牛山専門家報告

（視聴覚教育）

昭和59年6月27日 ～ 昭和59年8月26日

調　査　結　果　要　約

実　施　内　容

1984.6.27 より 1984.8.26 までマレイシア国，コタバルの National Water Management Training Centre（NWMTC）で行った業務は次のとおりである。

1. すでに現地に送られてはいたが，今だ設置されていなかったＡ－Ｖ機器（アンプ，スピーカー，16㎜映写機，35㎜スライド映写機）に関する設置計画案の作成とその実行
2. 同じく実物投映機の設置に関する設置計画案の作成とその実行
3. 視聴覚教材を制作するための部屋の設置に関する提案
4. 機器の点検と，修理を必要とする機器のリスト作成
5. さらに必要と思われるＡ－Ｖ機器と消耗品についてのリスト作成
6. 視聴覚機器の使用法，視聴覚教材作成法についてのレクチャー

問題点として次の点が考えられる。

1. 視聴覚機器は，いつでも使用できるように設置されているべきものであり，又誰でも使用できるよう使用法を習得させる必要がある。

   視聴覚機器の導入にあたっては，上記の２点が完了して始めて，導入が完了したと考えるべきであり，物品の送附のみでは不十分である。
2. 視聴覚機器に使用する教材（ソフト）がまだ不十分であり，機器はあるがそれに使用する映画フィルム，スライド，ビデオテープがないため機能していない。また，送られた教材が日本語版であるため，現地では使用されていない。

   教材の英文化もしくは現地語化が必要である。
3. 高温多湿である国では，視聴覚機材に対して次の障害が生じている。
   a. Ａ－Ｖ機器のレンズ部分，ミラー部分，映写用フィルムにカビが発生し，使用不可になる。
   b. Ａ－Ｖ機器内に使用しているゴムベルトの劣化により，切れ，のびが生じ，正常に作動しない。

   これを防ぐ為には，エアコン設備のある教材制作室を設置しここに機器，教材を保管するか，通常エアコンを使用している部屋に機器，教材を保管するかの配慮が必要である。
4. Ａ－Ｖ機器のメンテナンスについて

   今回の機器点検においてもいくつかのＡ－Ｖ機器に修理が必要な箇所が見つけられた。日本の機器メーカーも現地に代理店をもち修理を行っているが，複雑な機器については対応が十分ではなく，現地での修理が不可能な機器がある。東南アジアにおいてはシンガポールが

技術力も高くかなり高度な修理にも対応できると思われるが，発送，通関等の手続きにかなりの日時を要する。また金銭的に対応できる予算を持っているならば問題はないが，ほとんどの場合対応する予算的処置が不可能なため，一度こわれたら永久に使用されない機器が生じる。特に，国内仕様の機器を現地へ持っていった場合，現地にはサービスマニュアル，スペアパーツ等一切ないため修理は不可能であり，機器選択の際の十分な配慮が必要である。

5. 現地での自主教材の制作について

２の項とも関連があるが，自主制作できるＡ－Ｖ機器が現地にあっても，教材制作のノウハウを知らないため，制作されない場合が多い。機器の導入とともに，ソフト制作技術の指導が必ず必要である。Ａ－Ｖ機器設置が完了した時点での専門家派遣が望ましく，時期が経過した場合には，知らないで使用したり，誤って使用したりで機器がこわれている場合がある。

牛山専門家現地レポート

（視聴覚教育）

REPORTS

Project Name : Water Management Training Programe in Malaysia

Subject :

1. Checking, recording and storing of the Audio Visual equipments donated by the Japanese Goverment.
2. Development of the exhibition hall taking of photographs.
3. Development of some Audio Visual aids --- requests by the staff.
4. To prepare some notes and give lectures for the center's staff on :
   i) Audio Visual techniques for teaching
   ii) Audio Visual equipment
   iii) Preparation of Audio Visual aids
5. To give recommendations for additional Audio Visual equipment, if any, to fully equip the center's teaching facilities.

Period : From June 27, 1984 to August 26, 1984

Name : Masahide Ushiyama

Contents

Record of Daily Work

Date	Description
Jun 27	Arrived at Kota Bharu
28	Study in Water Management Training Centre
29	holiday
30	ditto
July 1	ditto
2	Meeting for JICA experts,Check the Audio Visual equipments
3	Prepare for lectures, Making lecture notes
4	Meeting, Check the Audio Visual equipments
5	Check the Audio Visual equipments
6	holiday
7	Making the layout for Audio Visual equipments in lecture rooms
8	Check the Audio Visual equipments
9	Photo-taking for exhibition hall
10	Discuss to electrical worker about wiring in lecture rooms
11	Photo-taking for exhibition hall
12	Lecture-Slide production
13	holiday
14	Photo taking for lectures
15	Check for taking Audio Visual equipments with me
16	Lecture-photo taking about fruits
17	Lecture-how to use the copy stand
18	Photo-taking for exhibition hall
19	Photo-taking for lectures (how to develop slide films)
20	holiday
21	Meeting to director of NWMTC, Making timetable for lectures
22	Lecture-how to photo-taking of close up
23	Check the script about introduction of NWMTC
24	Lecture-how to make duplicate of slide films
25	Lecture-how to develop slide films for Japanese experts
26	Lecture-photo taking about fruits
27	holiday
28	Check the Audio Visual equipments
29	Lecture-slide production
30	Check the script about introduction of NWMTC

July	31	Photo-taking for exhibition hall
Aug	1	Photo-taking for exhibition hall
	2	Arrange the script about introduction of NWMTC
	3	holiday
	4	Making samples of Transparency sheets
	5	Lecture-how to develop slide films
	6	ditto
	7	Lecture-how to use 16mm projectors & 8mm projectors
	8	Lecture-how to use ELMO E-6
	9	absent
	10	holiday
	11	Meeting for JICA experts, Lecture-how to photo taking
	12	Check the Audio Visual equipments
	13	Lecture-how to use video camera & video recorder
	14	ditto
	15	Official trip to Kuala Lumpur
	16	Visit to JICA office & JAPAN Embassy
	17	Visit to CIAST
	18	Return to Kota Bharu
	19	Put in order equipments
	20	ditto
	21	ditto
	22	Meeting final report
	23	Kota Bharu----Kuala Lumpur
	24	Report to JICA office
	25	holiday
	26	Kuala Lumpur----Tokyo
	27	Report to JICA office

To : Mr. C. C. Chan, July 7, 1984
Director,
NWMTC

Re. Proposal of location of Audio Visual equipment

Dear Mr.Chan,

I would like to propose one of plans of the location of Audio Visual equipments in the Audio Hall and class rooms as per attached sheets respectively.

For the better use of Audio Visual equipments they should not be placed in a strage, but be located at proper places to be used any time necessary.

It would be my pleasure if you could kindly consider my proposal for improvement of the training.

Sincerely yours,
M. Ushiyama
Short-term expert for Audio Visual Education.

Some basic ideas for arrangement of the Audio Visual equipment

1. Audio Visual equipment must be setted up for using at any time and for anyone who want to use.

2. Each classroom has one screen and one overhead projector.

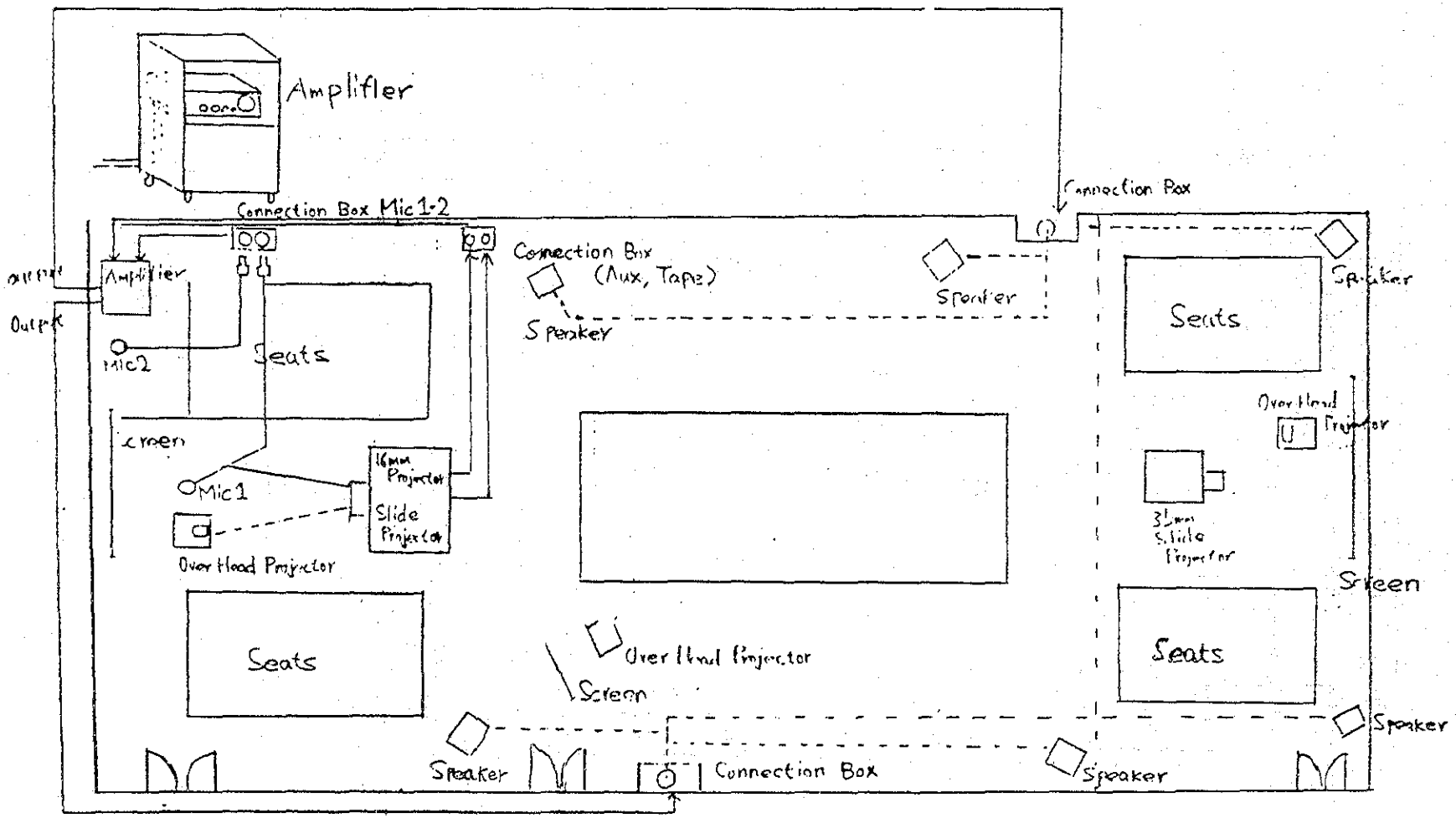
3. In bilik syarahan 1, we can operate16mm projector and 35mm slide projector.

4. In bilik syarahan 3, we can operate 35mm slide projector.

5. In bilik pandang dengar, we can operate 16mm projector and 35mm slide projector.

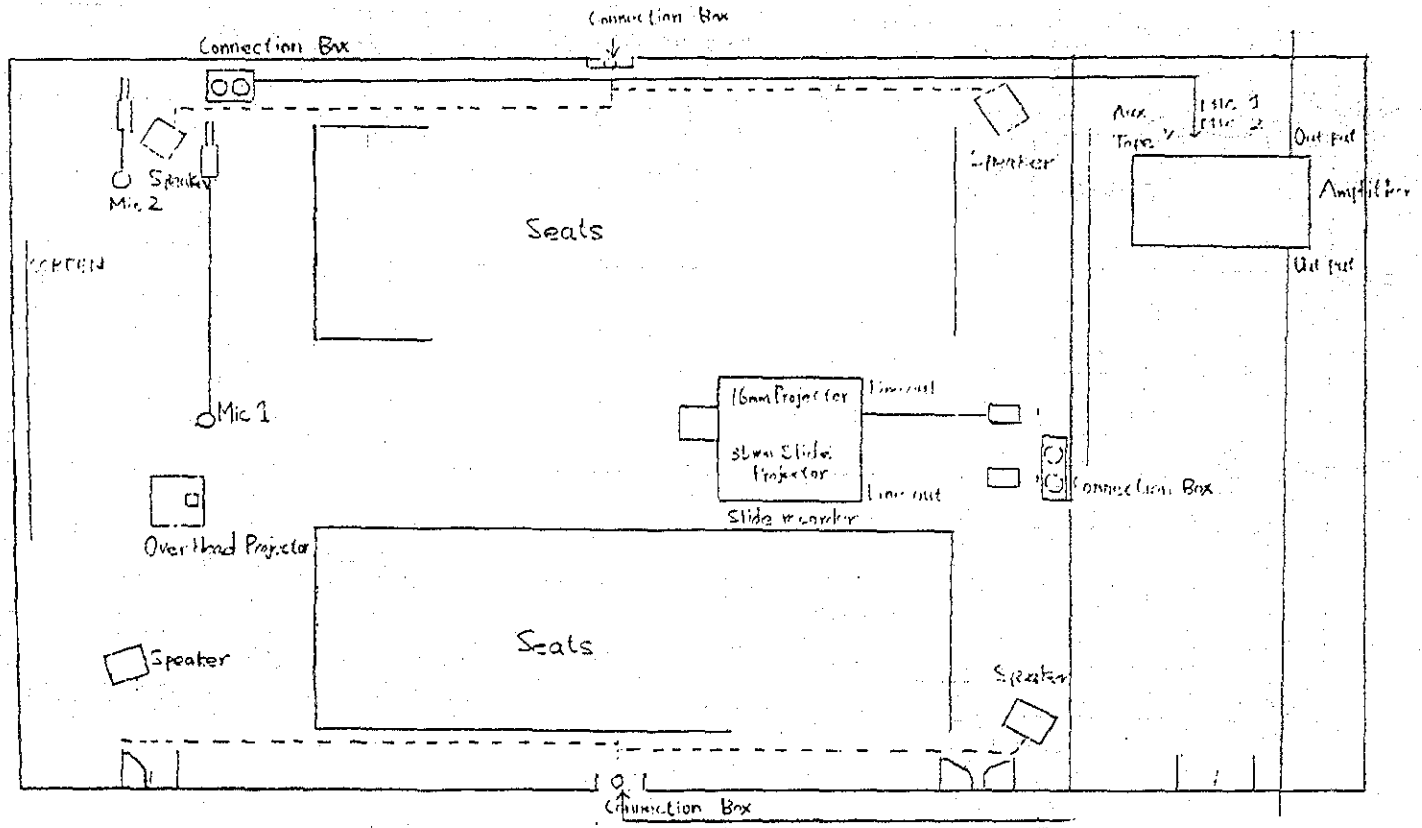
6. Regarding P.A system (Public Address system), we can change the position of speakers according to a number of audience.

< Class rooms >



BILIK SYARAHAN 1 BILIK SYARAHAN 2 BILIK SYARAHAN 3

< Auditorium Hall >

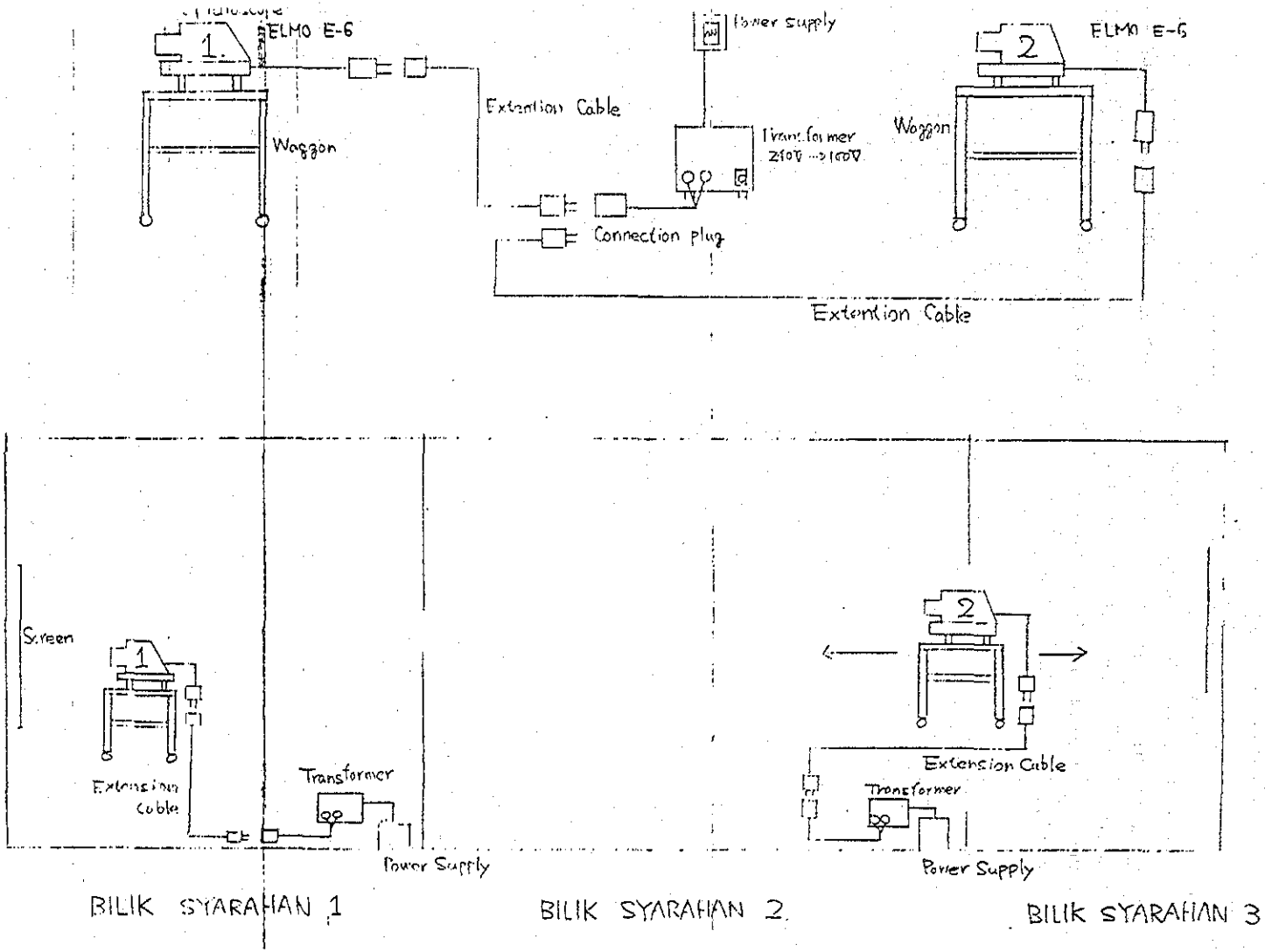


BILIK PANDANG DENGAN

BILIK PROJECTOR

Proposal of location of Epidiascope (ELMO E-6)

1. Now we have two Epidiascopes.(ELMO E-6)
2. We will fix the transformer in bilik syarahan 1 and 2 using extention cable we can operate Epidiascope.
3. We will arrange Epidiascope (No.2) in bilik syarahan 2 or 3. And using long extention cable.


ELMO E-6
1
Waggon
Extention Cable
Power Supply
Transformer
240V → 100V
Connection plug
2
ELMO E-6
Waggon
Extention Cable
Screen
1
Extension Cable
Transformer
Power Supply
2
Extension Cable
Transformer
Power Supply
BILIK SYARAHAN 1
BILIK SYARAHAN 2
BILIK SYARAHAN 3

Suggestion of set up the room for produce the Audio Visual teaching materials

Now, we don't have the room for produce the Audio Visual teaching materials. We had better to set up the room for taking pictures of goods, close-up, copies.
And, I suggest that the projector room must be arranged to the room for produce the Audio Visual teaching materials.
Therefore we must do following items.

1. To set up curtains for cut off the sunlight.
2. To set up an air conditioner for protect a high temperature and a high humidity.

Now, we are keeping many Audio Visual equipments and 16mm films, 35mm slide films in the projector room, but in this room it has a high temperature and a high humidity.
It is very bad condition for keeping the these equipments.

As soon as possible we set up an air conditioner whether you set up the producing room or not.
Then you had better to operate the air conditioner if the worker is in the projector room or not.

Proposal of repairing

I checked the Audio Visual equipments donated by the Japanese Goverment.

Some of them were making trouble inside.

We need to repair.

I will show the list.

No.	Name of equipment	Company	Serial No.	Damaged part	Remark
1	OM-1 Camera	Olympus	1814863	Prism finder (moldiness)	
2	Zuiko lens 35-70mm 1:3.6	ditto	251188	Lens (ditto)	
3	Zuiko lens 85-250mm 1:5	ditto	108772	ditto (ditto)	
4	Zuiko lens 50mm 1:1.8	ditto	1488220	ditto (ditto)	
5	Nikkor lens 135mm 1:2.8	Nikon	826084	ditto (ditto)	
6	Nikkor lens 50mm 1:1.4	ditto	4125649	ditto (ditto)	
7	Nikkor lens 80-200mm 1:4.5	ditto	872747	ditto (ditto)	
8	Mamiya 135 Camera	Mamiya	80104856	ditto (ditto)	
9	Lens for ELMO slide projector AS3000A	Elmo	(50459)	ditto (ditto)	
10	ditto	ditto	(50298)	ditto (ditto)	
11	Lens for ELMO 16mm projector 16-AA	ditto		ditto (ditto)	
12	Zoom lens for ELMO 16mm projector	ditto		ditto (ditto)	
13	TV zoom lens for Color Video Camera	JVC	103203	ditto (ditto)	
14	Slide projector AS-3000A	Elmo	50459	Gear mechanism	
15	ditto	ditto	50298	ditto	

16	Portable Video cassette recorder	JVC	7310476	Loading mechanism	
17	Wireless amplifier WX-711	National	981138	Condenser parts	

* Olympus JVC Elmo

HAGEMEYER EQUIPMENT SDN, BHD

15A Jalan University, Petaling Jaya, Malaysia Tel 571244

* National

MATSUSHITA SALES & SERVICE SDN, BHD

Lot 10, Jalan 13-2 Petaling Jaya, Malaysia Tel 576622

* Nikon

SHRIRO (MALAYSIA) SDN, BHD

9 Jalan Dua. Off Jalan. Chan Son Lin. Kuala Lumpur Tel 435688 435708