

APPENDIX

Appendix Table 1. Chemical and physical soil properties at the experiment site.

Soil property	Soil depth (m)				
	0-0.2	0.2-0.4	0.4-0.6	0.6-0.8	0.8-1.0
pH (Soil : H ₂ O = 1:1)	5.4	4.6	4.5	4.2	4.2
O.M. (%)	1.00	0.53	0.40	0.27	0.13
N (%)	0.18	0.14	0.10	0.14	0.07
Avail. P (ppm)	151	81	6	14	4
Exch. K (ppm)	15	15	15	15	22
CEC (meq/100g.soil)	7.6	6.1	8.1	8.8	9.6
Bulk density (g/cm ³)	1.89	1.94	1.83	1.75	1.74
Hydraulic conductivity(cm/sec)	4.2 x 10 ⁻⁵	2.4 x 10 ⁻⁶	3.2 x 10 ⁻⁴	5.0 x 10 ⁻⁶	1.39 x 10 ⁻⁶
Soil hardness (g/cm ²)	6.48	76.55	3.40	3.35	5.47
Particle size (%)					
- Sand	56.8	56.8	56.8	56.8	50.8
- Silt	28.0	24.0	14.0	14.0	16.0
- Clay	15.2	19.2	29.2	29.2	33.2
Texture	Sandy loam	Sandy loam	Sandy Clay loam	Sandy Clay loam	Sandy Clay loam
Field Capacity (0.33 Bar, % by dry weight)	14.265	13.612	17.435	17.883	20.653
Permanent Wilting Point (15 Bar, % by dry weight)	4.889	4.448	8.782	8.791	10.913
Available Moisture Content (% by dry weight)	9.376	9.164	8.653	9.092	9.740

Analysis method : N = Kjeldahl method

P = Bray II method

K = 1N NH₄OAc, pH 7.0 extraction

CEC = 1N NH₄OAc, pH 7.0 extraction

Appendix Table 2 Schedule of irrigation treatment applied during the 1998 and 1999 growing seasons.

1998			1999		
Date	DAE	Irrigation Method	Date	DAE	Irrigation Method
24 Dec 97	-5	UT*	24 Dec 98	-5	UT
29 Dec 97	0	UT	6 Jan 99	0	UT
5 Jan 98	7	UT	13 Jan 99	7	UT
12 Jan 98	14	LS**	20 Jan 99	14	LS
19 Jan 98	21	LS	27 Jan 99	21	LS
26 Jan 98	28	LS	3 Feb 99	28	Rain
2 Feb 98	35	LS	10 Feb 99	35	LS
9 Feb 98	42	LS	17 Feb 99	42	LS
16 Feb 98	49	LS	24 Feb 99	49	LS
23 Feb 98	56	LS	3 Mar 99	56	LS
2 Mar 98	63	LS	10 Mar 99	63	LS
9 Mar 98	70	LS	17 Mar 99	70	LS
16 Mar 98	77	LS	24 Mar 99	77	LS
23 Mar 98	84	LS	31 Mar 99	84	LS
30 Mar 98	90	Rain	7 Apr 99	90	Rain

* Uniform irrigation

** Line source sprinkler irrigation

Appendix Table 3 Simple linear regression (N = 12) between grain yield and reduction in water applied of thirty-one maize genotypes in 1998.

Entries	Water regimes			Grain yield potential (Intercept, a)	Drought susceptibility (Slope, b)	r ²
	Wet	Intermediate	Dry			
Water applied	412	259	137			
NSX9210	7306	6343	5418	8210	-7.2	0.445*
NSX9213	6918	5974	5116	7813	-7.0	0.396*
NSX9601	6567	6164	4941	7409	-5.7	0.486*
NSX9605	6353	6230	5241	6948	-3.9	0.358*
NSX9607	7661	6704	5638	8632	-7.6	0.548**
NSX9608	6550	6677	5149	7660	-5.6	0.581**
NTX9701	7068	5892	4723	8047	-8.2	0.696**
NTX9702	7315	6859	5607	8227	-6.1	0.569**
NTX9703	6819	6542	5202	7612	-5.5	0.378*
SW3601	7367	6656	6017	8016	-5.2	0.431*
CP222	5807	5744	4483	6453	-4.2	0.357*
DK888	8281	7319	6452	9393	-7.5	0.330*
PIO3012	8840	7768	5773	10240	-10.9	0.581**
PIO3013	8204	7354	5454	9413	-9.4	0.437*
PAC300	7547	7462	4923	9190	-9.6	0.564**
PAC328	6393	6309	4000	7737	-8.2	0.560**
PAC700	8118	8160	4086	10429	-13.7	0.487*
CIBA49(TV)	7782	7230	5453	8891	-8.0	0.581**
CIBA45(LD)	8005	7425	6132	8994	-6.9	0.456*
G5431(D)	7192	6536	5821	7895	-5.3	0.445*
CARG717	7456	6733	6122	8123	-5.2	0.510**
CARG727	8357	8114	5520	10087	-10.3	0.583**
CARG919	7437	7229	6203	8264	-4.9	0.391*
CARG922	7316	6689	6178	7827	-4.2	0.339*
CARG7118	7408	7319	5177	8765	-8.2	0.423*
CARG7122	8569	8140	5563	10262	-10.9	0.405*
CARG7140	8148	7949	6516	9021	-5.7	0.357*
KK-DR	6492	5999	4802	7263	-5.7	0.544**
NST89101	6489	5338	4257	7522	-8.3	0.691**
NS1	7328	6576	4885	8561	-8.2	0.411*
SW1	6820	6367	4719	7973	-7.6	0.554**
Mean	7358.5	6832.4	5341.1	8415	-7.3	

* , ** Significant at the 0.05 and 0.01 levels of probability, respectively.

Appendix Table 4 Soil properties for Phen series from ThaiSIS.

*IB00610004	SCS	Pn	150 UNKNOWN t Phen													
@SITE	COUNTRY		LAT	LONG	SCS	FAMILY										
UNKNOWN	THAILAND		-99	-99	TYPIC PLINTHAQUULTS											
@_SCO	SALB	SLU1	SLDR	SLRO	SLNF	SLPF	SMHB	SMPX	SMKE							
BN	0.13	27.6	0	76	1	1	IB001	IB001	IB001							
@	SLB	SLM	SLLL	SDUL	SSAT	SRGF	SSKS	SBDM	SLOC	SLCL	SLSI	SLCF	SLNI	SLHW	SLHB	SCEC
13	C1		0.113	0.231	0.334	0.88	-99	1.61	0.58	15.2	28	0	-99	5.4	4.2	7.6
25	C2		0.162	0.276	0.34	0.68	-99	1.59	0.31	19.2	24	0	-99	4.6	4.2	6.1
48	AP		0.294	0.414	0.429	1	-99	1.38	0.23	29.2	14	0	-99	4.5	3.9	8.1
90	BT		0.303	0.422	0.437	0.2	-99	1.38	0.08	33.2	16	0	-99	4.2	3.9	9.6
150	BT		0.311	0.435	0.45	0.09	-99	1.43	0.07	61.9	32.2	0	-99	5.4	3.9	22.9

Appendix Table 5 FILEA for calculation of genetic coefficients of three maize varieties.

(a) NS 1

*EXP.DATA (A) : PLFC9802.MZ PLANTING DATE/NS1

@TRNO	HWAM	HWUM	H#AM	H#UM	LAIX	CWAM	BWAH	ADAT	MDAT	GN%M	CNAM	SNAM	GNAM
1	4569	0.186	2456	461	3.38	13546	-99	26	71	-99	-99	-99	-99
2	3324	0.148	2249	422	2.73	14166	-99	84	121	-99	-99	-99	-99
3	2615	0.133	1960	367	2.16	8660	-99	143	180	-99	-99	-99	-99
4	3174	0.162	1953	366	2.68	10784	-99	205	245	-99	-99	-99	-99
5	2451	0.117	2085	391	2.96	9947	-99	265	303	-99	-99	-99	-99

(b) NSX 9210

*EXP.DATA (A) : PLFC9803.MZ PLANTING DATE/NSX 9210

@TRNO	HWAM	HWUM	H#AM	H#UM	LAIX	CWAM	BWAH	ADAT	MDAT	GN%M	CNAM	SNAM	GNAM
1	4534	0.168	2693	505	3.86	13979	-99	27	71	-99	-99	-99	-99
2	4172	0.155	2684	503	3.06	14715	-99	86	124	-99	-99	-99	-99
3	3153	0.155	2035	381	2.41	10685	-99	143	181	-99	-99	-99	-99
4	3788	0.166	2276	427	3.16	12900	-99	206	246	-99	-99	-99	-99
5	3370	0.139	2424	454	3.21	11818	-99	265	304	-99	-99	-99	-99

(c) SW 3601

*EXP.DATA (A) : PLFC9804.MZ PLANTING DATE/SW3601

@TRNO	HWAM	HWUM	H#AM	H#UM	LAIX	CWAM	BWAH	ADAT	MDAT	GN%M	CNAM	SNAM	GNAM
1	5333	0.18	2965	556	3.81	14468	-99	24	68	-99	-99	-99	-99
2	4567	0.17	2681	503	2.88	14267	-99	83	120	-99	-99	-99	-99
3	3755	0.164	2291	429	2.57	9975	-99	142	180	-99	-99	-99	-99
4	3863	0.166	2328	436	3.15	10073	-99	205	245	-99	-99	-99	-99
5	3796	0.155	2453	460	3.1	11451	-99	264	303	-99	-99	-99	-99

Appendix Table 6 FILEX for calculation of genetic coefficients of NS 1.

```

*EXP.DETAILS: PLFC9802MZ PLANTING DATE/NAKHON SAWAN-1
*GENERAL
@PEOPLE
  SOMCHAI BOONPRADUB
@ADDRESS
  PHITSANULOK FCES, PHITSANULOK, THAILAND
@SITE
  PHITSANULOK, THAILAND. 16.47 N, 100.16 E
@ PAREA PRNO PLEN PLDR PLSP PLAY HAREA HRNO HLEN HARM.....
  27.0 6 6.0 -99 450 N-S 9.0 4 3.0 HAND HARVEST
*TREATMENTS
-----FACTOR LEVELS-----
@N R O C TNAME..... CU FL SA IC MP MI MF MR MC MT ME MH SM
  1 1 0 0 PD1XNS1 1 1 0 0 1 0 1 0 0 0 0 0 0 1
  2 1 0 0 PD2XNS1 1 2 0 0 2 0 2 0 0 0 0 0 0 2
  3 1 0 0 PD3XNS1 1 2 0 0 3 0 3 0 0 0 0 0 0 3
  4 1 0 0 PD4XNS1 1 2 0 0 4 0 4 0 0 0 0 0 0 4
  5 1 0 0 PD5XNS1 1 2 0 0 5 0 5 0 0 0 0 0 0 5
*CULTIVARS
@C CR INGENO CNAME
  1 MZ DA0001 NAKHON SAWAN-1
*FIELDS
@L ID FIELD WSTA.... FLSA FLOB FLDT FLDD FLDS FLST SLTX SLDP ID SQIL
  1 PLFC0001 PLFC9701 -99 0 DR000 0 0 00000 -99 51 IB00610004
  2 PLFC0001 PLFC9801 -99 0 DR000 0 0 00000 -99 51 IB00610004
*PLANTING DETAILS
@P PDATE EDATE PPOP PPOE PLME PLDS PLRS PLRD PLDP PLWT PAGE PENV PLPH
  1 97332 -99 5.3 5.3 S H 75 0 5.0 -99 -99 -99.0 1.0
  2 98028 -99 5.3 5.3 S H 75 0 5.0 -99 -99 -99.0 1.0
  3 98087 -99 5.3 5.3 S H 75 0 5.0 -99 -99 -99.0 1.0
  4 98149 -99 5.3 5.3 S H 75 0 5.0 -99 -99 -99.0 1.0
  5 98210 -99 5.3 5.3 S H 75 0 5.0 -99 -99 -99.0 1.0
*FERTILIZERS (INORGANIC)
@F FDATE FMCD FACD FDEP FAMN FAMP FAMK FAMC FAMO FOCD
  1 97332 FE002 -99 10 50 -99 -99 -99 -99 -99
  1 97362 FE005 -99 10 70 -99 -99 -99 -99 -99
  2 98028 FE002 -99 10 50 -99 -99 -99 -99 -99
  2 98058 FE005 -99 10 70 -99 -99 -99 -99 -99
  3 98087 FE002 -99 10 50 -99 -99 -99 -99 -99
  3 98117 FE005 -99 10 70 -99 -99 -99 -99 -99
  4 98149 FE002 -99 10 50 -99 -99 -99 -99 -99
  4 98179 FE005 -99 10 70 -99 -99 -99 -99 -99
  5 98210 FE002 -99 10 50 -99 -99 -99 -99 -99
  5 98240 FE005 -99 10 70 -99 -99 -99 -99 -99
*SIMULATION CONTROLS
@N GENERAL NYERS NREPS START SDATE RSEED SNAME.....
  1 GE 1 1 S 97332 2150 VALIDATION OF CERES-MAIZE
@N OPTIONS WATER NITRO SYMBI PHOSP POTAS DISES
  1 OP Y Y Y N N N
@N METHODS WTHR INCON LIGHT EVAPO INFIL PHOTO
  1 ME M M E R S C
@N MANAGEMENT PLANT IRRIG FERTI RESID HARVS
  1 MA R A R R M
@N OUTPUTS XCODE OVVEW SUMRY FROPT GROTH CARBN WATER NITRO MINER DISES LONG
  1 OU N Y Y 1 Y N Y Y N N Y

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Appendix Table 6 (continue)

@ AUTOMATIC MANAGEMENT											
@N PLANTING	PFRST	PLAST	PH2OL	PH2OU	PH2OD	PSTMX	PSTMN				
1 PL	155	200	40	100	30	40	10				
@N IRRIGATION	IMDEP	ITHRL	ITHRU	IROFF	IMETH	IRAMT	IREFF				
1 IR	30	50	100	GS000	IR001	10	0.50				
@N NITROGEN	NMDEP	NMTHR	NAMNT	NCODE	NAOFF						
1 NI	30	50	25	FE001	GS000						
@N RESIDUES	RIPC�	RTIME	RIDEP								
1 RE	100	1	20								
@N HARVEST	HFRST	HLAST	HPCNP	HPCNR							
1 HA	0	365	100	0							
*SIMULATION CONTROLS											
@N GENERAL	NYERS	NREPS	START	SDATE	RSEED	SNAME				
2 GE	1	1	S	98028	2150	VALIDATION OF CERES-MAIZE					
@N OPTIONS	WATER	NITRO	SYMBI	PHOSP	POTAS	DISES					
2 OP	Y	Y	Y	N	N	N					
@N METHODS	WTHFR	INCON	LIGHT	EVAPO	INFIL	PHOTO					
2 ME	M	M	E	R	S	C					
@N MANAGEMENT	PLANT	IRRIG	FERTI	RESID	HARVS						
2 MA	R	A	R	R	M						
@N OUTPUTS	XCODE	OVVEW	SUMRY	FROPT	GROTH	CARBN	WATER	NITRO	MINER	DISES	LONG
2 OU	N	Y	Y	1	Y	N	Y	Y	N	N	Y
@ AUTOMATIC MANAGEMENT											
@N PLANTING	PFRST	PLAST	PH2OL	PH2OU	PH2OD	PSTMX	PSTMN				
2 PL	155	200	40	100	30	40	10				
@N IRRIGATION	IMDEP	ITHRL	ITHRU	IROFF	IMETH	IRAMT	IREFF				
2 IR	30	50	100	GS000	IR001	10	0.50				
@N NITROGEN	NMDEP	NMTHR	NAMNT	NCODE	NAOFF						
2 NI	30	50	25	FE001	GS000						
@N RESIDUES	RIPC�	RTIME	RIDEP								
2 RE	100	1	20								
@N HARVEST	HFRST	HLAST	HPCNP	HPCNR							
2 HA	0	365	100	0							
*SIMULATION CONTROLS											
@N GENERAL	NYERS	NREPS	START	SDATE	RSEED	SNAME				
3 GE	1	1	S	98087	2150	VALIDATION OF CERES-MAIZE					
@N OPTIONS	WATER	NITRO	SYMBI	PHOSP	POTAS	DISES					
3 OP	Y	Y	Y	N	N	N					
@N METHODS	WTHFR	INCON	LIGHT	EVAPO	INFIL	PHOTO					
3 ME	M	M	E	R	S	C					
@N MANAGEMENT	PLANT	IRRIG	FERTI	RESID	HARVS						
3 MA	R	A	R	R	M						
@N OUTPUTS	XCODE	OVVEW	SUMRY	FROPT	GROTH	CARBN	WATER	NITRO	MINER	DISES	LONG
3 OU	N	Y	Y	1	Y	N	Y	Y	N	N	Y
@ AUTOMATIC MANAGEMENT											
@N PLANTING	PFRST	PLAST	PH2OL	PH2OU	PH2OD	PSTMX	PSTMN				
3 PL	155	200	40	100	30	40	10				
@N IRRIGATION	IMDEP	ITHRL	ITHRU	IROFF	IMETH	IRAMT	IREFF				
3 IR	30	50	100	GS000	IR001	10	0.50				
@N NITROGEN	NMDEP	NMTHR	NAMNT	NCODE	NAOFF						
3 NI	30	50	25	FE001	GS000						
@N RESIDUES	RIPC�	RTIME	RIDEP								
3 RE	100	1	20								
@N HARVEST	HFRST	HLAST	HPCNP	HPCNR							
3 HA	0	365	100	0							

Appendix Table 6 (continue)

*SIMULATION CONTROLS

@N GENERAL	NYERS	NREPS	START	SDATE	RSEED	SNAME.....					
4 GE	1	1	S	98149	2150	VALIDATION OF CERES-MAIZE					
@N OPTIONS	WATER	NITRO	SYMBI	PHOSP	POTAS	DISES					
4 OP	Y	Y	Y	N	N	N					
@N METHODS	WTHER	INCON	LIGHT	EVAPO	INFIL	PHOTO					
4 ME	M	M	E	R	S	C					
@N MANAGEMENT	PLANT	IRRIG	FERTI	RESID	HARVS						
4 MA	R	A	R	R	M						
@N OUTPUTS	XCODE	OVVEW	SUMRY	FROPT	GROTH	CARBN	WATER	NITRO	MINER	DISES	LONG
4 OU	N	Y	Y	1	Y	N	Y	Y	N	N	Y

@ AUTOMATIC MANAGEMENT

@N PLANTING	PFIRST	PLAST	PH2OL	PH2OU	PH2OD	PSTMX	PSTMN				
4 PL	155	200	40	100	30	40	10				
@N IRRIGATION	IMDEP	ITHRL	ITHRU	IROFF	IMETH	IRAMT	IREFF				
4 IR	30	50	100	GS000	IR001	10	0.50				
@N NITROGEN	NMDEP	NMTHR	NAMNT	NCODE	NAOFF						
4 NI	30	50	25	FE001	GS000						
@N RESIDUES	RIPCN	RTIME	RIDEP								
4 RE	100	1	20								
@N HARVEST	HERST	HLAST	HPCNP	HPCNR							
4 HA	0	365	100	0							

*SIMULATION CONTROLS

@N GENERAL	NYERS	NREPS	START	SDATE	RSEED	SNAME.....					
5 GE	1	1	S	98210	2150	VALIDATION OF CERES-MAIZE					
@N OPTIONS	WATER	NITRO	SYMBI	PHOSP	POTAS	DISES					
5 OP	Y	Y	Y	N	N	N					
@N METHODS	WTHER	INCON	LIGHT	EVAPO	INFIL	PHOTO					
5 ME	M	M	E	R	S	C					
@N MANAGEMENT	PLANT	IRRIG	FERTI	RESID	HARVS						
5 MA	R	A	R	R	M						
@N OUTPUTS	XCODE	OVVEW	SUMRY	FROPT	GROTH	CARBN	WATER	NITRO	MINER	DISES	LONG
5 OU	N	Y	Y	1	Y	N	Y	Y	N	N	Y

@ AUTOMATIC MANAGEMENT

@N PLANTING	PFIRST	PLAST	PH2OL	PH2OU	PH2OD	PSTMX	PSTMN				
5 PL	155	200	40	100	30	40	10				
@N IRRIGATION	IMDEP	ITHRL	ITHRU	IROFF	IMETH	IRAMT	IREFF				
5 IR	30	50	100	GS000	IR001	10	0.50				
@N NITROGEN	NMDEP	NMTHR	NAMNT	NCODE	NAOFF						
5 NI	30	50	25	FE001	GS000						
@N RESIDUES	RIPCN	RTIME	RIDEP								
5 RE	100	1	20								
@N HARVEST	HERST	HLAST	HPCNP	HPCNR							
5 HA	0	365	100	0							

Appendix Table 7 FILEX for calculation of genetic coefficients of NSX 9210.

```

*EXP.DETAILS: PLFC9803MZ PLANTING DATE/NAKHON SAWAN-72
*GENERAL
@PEOPLE
SOMCHAI BOONPRADUB
@ADDRESS
PHITSANULOK FCES, PHITSANULOK, THAILAND
@SITE
PHITSANULOK, THAILAND. 16.47 N, 100.16 E
@ PAREA PRNO PLEN PLDR PLSP PLAY HAREA HRNO HLEN HARM.....
 27.0 6 6.0 -99 450 N-S 9.0 4 3.0 HAND HARVEST
*TREATMENTS
-----FACTOR LEVELS-----
@N R O C TNAME..... CU FL SA IC ME MI MF MR MC MT ME MH SM
 1 1 0 0 PD1XNSX9210 1 1 0 0 1 0 1 0 0 0 0 0 1
 2 1 0 0 PD2XNSX9210 1 2 0 0 2 0 2 0 0 0 0 0 2
 3 1 0 0 PD3XNSX9210 1 2 0 0 3 0 3 0 0 0 0 0 3
 4 1 0 0 PD4XNSX9210 1 2 0 0 4 0 4 0 0 0 0 0 4
 5 1 0 0 PD5XNSX9210 1 2 0 0 5 0 5 0 0 0 0 0 5

*CULTIVARS
@C CR INGENO CNAME
 1 MZ DA0002 NAKHON SAWAN-72

*FIELDS
@L ID FIELD WSTA.... FLSA FLOB FLDT FLDD FLDS FLST SLTX SLDP ID SOIL
 1 PLFC0001 PLFC9701 -99 0 DR000 0 0 00000 -99 51 IB00610004
 2 PLFC0001 PLFC9801 -99 0 DR000 0 0 00000 -99 51 IB00610004

*PLANTING DETAILS
@P PDATE EDATE PPOP PPOE PLME PLDS PLRS PLRD PLDP PLWT PAGE PENV PLPH
 1 97332 -99 5.3 5.3 S H 75 0 5.0 -99 -99 -99.0 1.0
 2 98028 -99 5.3 5.3 S H 75 0 5.0 -99 -99 -99.0 1.0
 3 98087 -99 5.3 5.3 S H 75 0 5.0 -99 -99 -99.0 1.0
 4 98149 -99 5.3 5.3 S H 75 0 5.0 -99 -99 -99.0 1.0
 5 98210 -99 5.3 5.3 S H 75 0 5.0 -99 -99 -99.0 1.0

*FERTILIZERS (INORGANIC)
@F FDATE FMCD FACD FDEP FAMN FAMP FAMK FAMC FAMO FOCD
 1 97332 FE002 -99 10 50 -99 -99 -99 -99 -99
 1 97362 FE005 -99 10 70 -99 -99 -99 -99 -99
 2 98028 FE002 -99 10 50 -99 -99 -99 -99 -99
 2 98058 FE005 -99 10 70 -99 -99 -99 -99 -99
 3 98087 FE002 -99 10 50 -99 -99 -99 -99 -99
 3 98117 FE005 -99 10 70 -99 -99 -99 -99 -99
 4 98149 FE002 -99 10 50 -99 -99 -99 -99 -99
 4 98179 FE005 -99 10 70 -99 -99 -99 -99 -99
 5 98210 FE002 -99 10 50 -99 -99 -99 -99 -99
 5 98240 FE005 -99 10 70 -99 -99 -99 -99 -99

*SIMULATION CONTROLS
@N GENERAL NYERS NREPS START SDATE RSEED SNAME.....
 1 GE 1 1 S 97332 2150 VALIDATION OF CERES-MAIZE
@N OPTIONS WATER NITRO SYMBI PHOSP POTAS DISES
 1 OP Y Y Y N N N
@N METHODS WTHFR INCON LIGHT EVAPO INFIL PHOTO
 1 ME M M E R S C
@N MANAGEMENT PLANT IRRIG FERTI RESID HARVS
 1 MA R A R R M
@N OUTPUTS XCODE OVVEW SUMRY FROPT GROTH CAREN WATER NITRO MINER DISES LONG
 1 OU N Y Y 1 Y N Y Y N N Y
    
```

Appendix Table 7 (continue)

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@ AUTOMATIC MANAGEMENT
@N PLANTING   PFRST PLAST PH2OL PH2OU PH2OD PSTMX PSTMN
 1 PL        155   200   40   100   30   40   10
@N IRRIGATION IMDEP ITHRL ITHRU IROFF IMETH IRAMT IREFF
 1 IR         30   50   100 GS000 IR001   10  0.50
@N NITROGEN   NMDEP NMTHR NAMNT NCODE NAOFF
 1 NI         30   50   25 FE001 GS000
@N RESIDUES   RIPCN RTIME RIDEP
 1 RE         100   1   20
@N HARVEST    HFRST HLAST HPCNP HPCNR
 1 HA         0   365  100   0

*SIMULATION CONTROLS
@N GENERAL    NYERS NREPS START SDATE RSEED SNAME.....
 2 GE         1     1     S 98028  2150 VALIDATION OF CERES-MAIZE
@N OPTIONS    WATER NITRO SYMBI PHOSP POTAS DISES
 2 OP         Y     Y     Y     N     N     N
@N METHODS    WTHFR INCON LIGHT EVAPO INFIL PHOTO
 2 ME         M     M     E     R     S     C
@N MANAGEMENT PLANT IRRIG FERTI RESID HARVS
 2 MA         R     A     R     R     M
@N OUTPUTS    XCODE OVVEW SUMRY FROPT GROTH CARBN WATER NITRO MINER DISES LONG
 2 OU         N     Y     Y     1     Y     N     Y     Y     N     N     Y

@ AUTOMATIC MANAGEMENT
@N PLANTING   PFRST PLAST PH2OL PH2OU PH2OD PSTMX PSTMN
 2 PL        155   200   40   100   30   40   10
@N IRRIGATION IMDEP ITHRL ITHRU IROFF IMETH IRAMT IREFF
 2 IR         30   50   100 GS000 IR001   10  0.50
@N NITROGEN   NMDEP NMTHR NAMNT NCODE NAOFF
 2 NI         30   50   25 FE001 GS000
@N RESIDUES   RIPCN RTIME RIDEP
 2 RE         100   1   20
@N HARVEST    HFRST HLAST HPCNP HPCNR
 2 HA         0   365  100   0

*SIMULATION CONTROLS
@N GENERAL    NYERS NREPS START SDATE RSEED SNAME.....
 3 GE         1     1     S 98087  2150 VALIDATION OF CERES-MAIZE
@N OPTIONS    WATER NITRO SYMBI PHOSP POTAS DISES
 3 OP         Y     Y     Y     N     N     N
@N METHODS    WTHFR INCON LIGHT EVAPO INFIL PHOTO
 3 ME         M     M     E     R     S     C
@N MANAGEMENT PLANT IRRIG FERTI RESID HARVS
 3 MA         R     A     R     R     M
@N OUTPUTS    XCODE OVVEW SUMRY FROPT GROTH CARBN WATER NITRO MINER DISES LONG
 3 OU         N     Y     Y     1     Y     N     Y     Y     N     N     Y

@ AUTOMATIC MANAGEMENT
@N PLANTING   PFRST PLAST PH2OL PH2OU PH2OD PSTMX PSTMN
 3 PL        155   200   40   100   30   40   10
@N IRRIGATION IMDEP ITHRL ITHRU IROFF IMETH IRAMT IREFF
 3 IR         30   50   100 GS000 IR001   10  0.50
@N NITROGEN   NMDEP NMTHR NAMNT NCODE NAOFF
 3 NI         30   50   25 FE001 GS000
@N RESIDUES   RIPCN RTIME RIDEP
 3 RE         100   1   20
@N HARVEST    HFRST HLAST HPCNP HPCNR
 3 HA         0   365  100   0

```

Appendix Table 7 (continue)

*SIMULATION CONTROLS

@N GENERAL	NYERS	NREPS	START	SDATE	RSEED	SNAME.....					
4 GE	1	1	S	98149	2150	VALIDATION OF CERES-MAIZE					
@N OPTIONS	WATER	NITRO	SYMBI	PHOSP	POTAS	DISES					
4 OP	Y	Y	Y	N	N	N					
@N METHODS	WTHR	INCON	LIGHT	EVAPO	INFIL	PHOTO					
4 ME	M	M	E	R	S	C					
@N MANAGEMENT	PLANT	IRRIG	FERTI	RESID	HARVS						
4 MA	R	A	R	R	M						
@N OUTPUTS	XCODE	OVVEW	SUMRY	FROPT	GROTH	CARBN	WATER	NITRO	MINER	DISES	LONG
4 OU	N	Y	Y	1	Y	N	Y	Y	N	N	Y

@ AUTOMATIC MANAGEMENT

@N PLANTING	PFRST	PLAST	PH2OL	PH2OU	PH2OD	PSTMX	PSTMN				
4 PL	155	200	40	100	30	40	10				
@N IRRIGATION	IMDEP	ITHRL	ITHRU	IROFF	IMETH	IRAMT	IREFF				
4 IR	30	50	100	GS000	IRO01	10	0.50				
@N NITROGEN	NMDEP	NMTHR	NAMNT	NCODE	NAOFF						
4 NI	30	50	25	FE001	GS000						
@N RESIDUES	RIPCN	RTIME	RIDEP								
4 RE	100	1	20								
@N HARVEST	HFRST	HLAST	HPCNP	HPCNR							
4 HA	0	365	100	0							

*SIMULATION CONTROLS

@N GENERAL	NYERS	NREPS	START	SDATE	RSEED	SNAME.....					
5 GE	1	1	S	98210	2150	VALIDATION OF CERES-MAIZE					
@N OPTIONS	WATER	NITRO	SYMBI	PHOSP	POTAS	DISES					
5 OP	Y	Y	Y	N	N	N					
@N METHODS	WTHR	INCON	LIGHT	EVAPO	INFIL	PHOTO					
5 ME	M	M	E	R	S	C					
@N MANAGEMENT	PLANT	IRRIG	FERTI	RESID	HARVS						
5 MA	R	A	R	R	M						
@N OUTPUTS	XCODE	OVVEW	SUMRY	FROPT	GROTH	CARBN	WATER	NITRO	MINER	DISES	LONG
5 OU	N	Y	Y	1	Y	N	Y	Y	N	N	Y

@ AUTOMATIC MANAGEMENT

@N PLANTING	PFRST	PLAST	PH2OL	PH2OU	PH2OD	PSTMX	PSTMN				
5 PL	155	200	40	100	30	40	10				
@N IRRIGATION	IMDEP	ITHRL	ITHRU	IROFF	IMETH	IRAMT	IREFF				
5 IR	30	50	100	GS000	IRO01	10	0.50				
@N NITROGEN	NMDEP	NMTHR	NAMNT	NCODE	NAOFF						
5 NI	30	50	25	FE001	GS000						
@N RESIDUES	RIPCN	RTIME	RIDEP								
5 RE	100	1	20								
@N HARVEST	HFRST	HLAST	HPCNP	HPCNR							
5 HA	0	365	100	0							

Appendix Table 8 FILEX for calculation of genetic coefficients of SW 3601.

*EXP.DETAILS: PLFC9804MZ PLANTING DATE/SUWAN 3601

*GENERAL

@PEOPLE

SOMCHAI BOONPRADUB

@ADDRESS

PHITSANULOK FCES, PHITSANULOK, THAILAND

@SITE

PHITSANULOK, THAILAND. 16.47 N, 100.16 E

@	PAREA	PRNO	PLEN	PLDR	PLSP	PLAY	HAREA	HRNO	HLEN	HARM
27.0	6	6.0	-99	450	N-S	9.0	4	3.0	HAND HARVEST	

*TREATMENTS

-----FACTOR LEVELS-----

@N	R	O	C	TNAME	CU	FL	SA	IC	MP	MI	MF	MR	MC	MT	ME	MH	SM
1	1	0	0	PD1XSW3601	1	1	0	0	1	0	1	0	0	0	0	0	1
2	1	0	0	PD2XSW3601	1	2	0	0	2	0	2	0	0	0	0	0	2
3	1	0	0	PD3XSW3601	1	2	0	0	3	0	3	0	0	0	0	0	3
4	1	0	0	PD4XSW3601	1	2	0	0	4	0	4	0	0	0	0	0	4
5	1	0	0	PD5XSW3601	1	2	0	0	5	0	5	0	0	0	0	0	5

*CULTIVARS

@C CR INGENO CNAME

1 MZ SW0001 SUWAN 3601

*FIELDS

@L	ID	FIELD	WSTA	FLSA	FLOB	FLDT	FLDD	FLDS	FLST	SLTX	SLDP	ID	SOIL
1	PLFC0001	PLFC9701	-99		0	DR000	0	0	00000	-99	51	IB00610004	
2	PLFC0001	PLFC9801	-99		0	DR000	0	0	00000	-99	51	IB00610004	

*PLANTING DETAILS

@P	PDATE	EDATE	PPOP	PPOE	PLME	PLDS	PLRS	PLRD	PLDP	PLWT	PAGE	PENV	PLPH
1	97332	97337	5.3	5.3	S	H	75	0	5.0	-99	-99	-99.0	1.0
2	98028	98033	5.3	5.3	S	H	75	0	5.0	-99	-99	-99.0	1.0
3	98087	98091	5.3	5.3	S	H	75	0	5.0	-99	-99	-99.0	1.0
4	98149	98154	5.3	5.3	S	H	75	0	5.0	-99	-99	-99.0	1.0
5	98210	98213	5.3	5.3	S	H	75	0	5.0	-99	-99	-99.0	1.0

*FERTILIZERS (INORGANIC)

@F	FDATE	FEMCD	FACD	FDEP	FAMN	FAMP	FAMK	FAMC	FAMO	FOCD
1	97332	FE002	-99	10	50	-99	-99	-99	-99	-99
1	97362	FE005	-99	10	70	-99	-99	-99	-99	-99
2	98028	FE002	-99	10	50	-99	-99	-99	-99	-99
2	98058	FE005	-99	10	70	-99	-99	-99	-99	-99
3	98087	FE002	-99	10	50	-99	-99	-99	-99	-99
3	98117	FE005	-99	10	70	-99	-99	-99	-99	-99
4	98149	FE002	-99	10	50	-99	-99	-99	-99	-99
4	98179	FE005	-99	10	70	-99	-99	-99	-99	-99
5	98210	FE002	-99	10	50	-99	-99	-99	-99	-99
5	98240	FE005	-99	10	70	-99	-99	-99	-99	-99

*SIMULATION CONTROLS

@N	GENERAL	NYERS	NREPS	START	SDATE	RSEED	SNAME					
1	GE	1	1	S	97332	2150	VALIDATION OF CERES-MAIZE					
@N	OPTIONS	WATER	NITRO	SYMBI	PHOSP	POTAS	DISES					
1	OP	Y	Y	Y	N	N	N					
@N	METHODS	WTHR	INCON	LIGHT	EVAPO	INFIL	PHOTO					
1	ME	M	M	E	R	S	C					
@N	MANAGEMENT	PLANT	IRRIG	FERTI	RESID	HARVS						
1	MA	R	A	R	R	M						
@N	OUTPUTS	XCODE	OVVEV	SUMRY	FROPT	GROTH	CARBN	WATER	NITRO	MINER	DISES	LONG
1	OU	N	Y	Y	1	Y	N	Y	Y	N	N	Y

Appendix Table 8 (continue)

@ AUTOMATIC MANAGEMENT

@N PLANTING	PFRST	PLAST	PH2OL	PH2OU	PH2OD	PSTMX	PSTMN
1 PL	155	200	40	100	30	40	10
@N IRRIGATION	IMDEP	ITHRL	ITHRU	IROFF	IMETH	IRAMT	IREFF
1 IR	30	50	100	GS000	IR001	10	0.50
@N NITROGEN	NMDEP	NMTHR	NAMNT	NCODE	NAOFF		
1 NI	30	50	25	FE001	GS000		
@N RESIDUES	RIPCEN	RTIME	RIDEP				
1 RE	100	1	20				
@N HARVEST	HRST	HLAST	HPCNP	HPCNR			
1 HA	0	365	100	0			

*SIMULATION CONTROLS

@N GENERAL	NYERS	NREPS	START	SDATE	RSEED	SNAME					
2 GE	1	1	S	98028	2150	VALIDATION OF CERES-MAIZE					
@N OPTIONS	WATER	NITRO	SYMBI	PHOSP	POTAS	DISES					
2 OP	Y	Y	Y	N	N	N					
@N METHODS	WTHER	INCON	LIGHT	EVAPO	INFIL	PHOTO					
2 ME	M	M	E	R	S	C					
@N MANAGEMENT	PLANT	IRRIG	FERTI	RESID	HARVS						
2 MA	R	A	R	R	M						
@N OUTPUTS	XCODE	OVVEW	SUMRY	FROPT	GROTH	CARBN	WATER	NITRO	MINER	DISES	LONG
2 OU	N	Y	Y	1	Y	N	Y	Y	N	N	Y

@ AUTOMATIC MANAGEMENT

@N PLANTING	PFRST	PLAST	PH2OL	PH2OU	PH2OD	PSTMX	PSTMN
2 PL	155	200	40	100	30	40	10
@N IRRIGATION	IMDEP	ITHRL	ITHRU	IROFF	IMETH	IRAMT	IREFF
2 IR	30	50	100	GS000	IR001	10	0.50
@N NITROGEN	NMDEP	NMTHR	NAMNT	NCODE	NAOFF		
2 NI	30	50	25	FE001	GS000		
@N RESIDUES	RIPCEN	RTIME	RIDEP				
2 RE	100	1	20				
@N HARVEST	HRST	HLAST	HPCNP	HPCNR			
2 HA	0	365	100	0			

*SIMULATION CONTROLS

@N GENERAL	NYERS	NREPS	START	SDATE	RSEED	SNAME					
3 GE	1	1	S	98087	2150	VALIDATION OF CERES-MAIZE					
@N OPTIONS	WATER	NITRO	SYMBI	PHOSP	POTAS	DISES					
3 OP	Y	Y	Y	N	N	N					
@N METHODS	WTHER	INCON	LIGHT	EVAPO	INFIL	PHOTO					
3 ME	M	M	E	R	S	C					
@N MANAGEMENT	PLANT	IRRIG	FERTI	RESID	HARVS						
3 MA	R	A	R	R	M						
@N OUTPUTS	XCODE	OVVEW	SUMRY	FROPT	GROTH	CARBN	WATER	NITRO	MINER	DISES	LONG
3 OU	N	Y	Y	1	Y	N	Y	Y	N	N	Y

@ AUTOMATIC MANAGEMENT

@N PLANTING	PFRST	PLAST	PH2OL	PH2OU	PH2OD	PSTMX	PSTMN
3 PL	155	200	40	100	30	40	10
@N IRRIGATION	IMDEP	ITHRL	ITHRU	IROFF	IMETH	IRAMT	IREFF
3 IR	30	50	100	GS000	IR001	10	0.50
@N NITROGEN	NMDEP	NMTHR	NAMNT	NCODE	NAOFF		
3 NI	30	50	25	FE001	GS000		
@N RESIDUES	RIPCEN	RTIME	RIDEP				
3 RE	100	1	20				
@N HARVEST	HRST	HLAST	HPCNP	HPCNR			
3 HA	0	365	100	0			

Appendix Table 8 (continue)

*SIMULATION CONTROLS

@N GENERAL	NYERS	NREPS	START	SDATE	RSEED	SNAME.....					
4 GE	1	1	S	98149	2150	VALIDATION OF CERES-MAIZE					
@N OPTIONS	WATER	NITRO	SYMBI	PHOSP	POTAS	DISES					
4 OP	Y	Y	Y	N	N	N					
@N METHODS	WTHFR	INCON	LIGHT	EVAPO	INFIL	PHOTO					
4 ME	M	M	E	R	S	C					
@N MANAGEMENT	PLANT	IRRIG	FERTI	RESID	HARVS						
4 MA	R	A	R	R	M						
@N OUTPUTS	XCODE	OVVEW	SUMRY	FROPT	GROTH	CARBN	WATER	NITRO	MINER	DISES	LONG
4 OU	N	Y	Y	1	Y	N	Y	Y	N	N	Y

@ AUTOMATIC MANAGEMENT

@N PLANTING	PFRST	PLAST	PH2OL	PH2OU	PH2OD	PSTMX	PSTMN				
4 PL	155	200	40	100	30	40	10				
@N IRRIGATION	IMDEP	ITHRL	ITHRU	IROFF	IMETH	IRAMT	IREFF				
4 IR	30	50	100	GS000	IRO01	10	0.50				
@N NITROGEN	NMDEP	NMTHR	NAMNT	NCODE	NAOFF						
4 NI	30	50	25	FE001	GS000						
@N RESIDUES	RIPCN	RTIME	RIDEP								
4 RE	100	1	20								
@N HARVEST	HRST	HLAST	HPCNP	HPCNR							
4 HA	0	365	100	0							

*SIMULATION CONTROLS

@N GENERAL	NYERS	NREPS	START	SDATE	RSEED	SNAME.....					
5 GE	1	1	S	98210	2150	VALIDATION OF CERES-MAIZE					
@N OPTIONS	WATER	NITRO	SYMBI	PHOSP	POTAS	DISES					
5 OP	Y	Y	Y	N	N	N					
@N METHODS	WTHFR	INCON	LIGHT	EVAPO	INFIL	PHOTO					
5 ME	M	M	E	R	S	C					
@N MANAGEMENT	PLANT	IRRIG	FERTI	RESID	HARVS						
5 MA	R	A	R	R	M						
@N OUTPUTS	XCODE	OVVEW	SUMRY	FROPT	GROTH	CARBN	WATER	NITRO	MINER	DISES	LONG
5 OU	N	Y	Y	1	Y	N	Y	Y	N	N	Y

@ AUTOMATIC MANAGEMENT

@N PLANTING	PFRST	PLAST	PH2OL	PH2OU	PH2OD	PSTMX	PSTMN				
5 PL	155	200	40	100	30	40	10				
@N IRRIGATION	IMDEP	ITHRL	ITHRU	IROFF	IMETH	IRAMT	IREFF				
5 IR	30	50	100	GS000	IRO01	10	0.50				
@N NITROGEN	NMDEP	NMTHR	NAMNT	NCODE	NAOFF						
5 NI	30	50	25	FE001	GS000						
@N RESIDUES	RIPCN	RTIME	RIDEP								
5 RE	100	1	20								
@N HARVEST	HRST	HLAST	HPCNP	HPCNR							
5 HA	0	365	100	0							

Appendix Table 9. Genetic coefficients and Standard deviation of three maize varieties by using GenCalc.

(a) NS 1

RUN		P1	P2	P5	G2	G3
1	New values	364.0	0.600	840.0	.000	.000
	Treatments	5	5	5	0	0
	S.D.'s	1673	74	5477	0	0
2	New values	.000	.000	.000	710.3	6.67
	Treatments	0	0	0	3	3
	S.D.'s	0	0	0	14135	29

b) NSX 9210

RUN		P1	P2	P5	G2	G3
1	New values	372.0	0.600	863.2	.000	.000
	Treatments	5	5	5	0	0
	S.D.'s	1095	80	2041	0	0
2	New values	.000	.000	.000	784.8	6.75
	Treatments	0	0	0	4	4
	S.D.'s	0	0	0	13094	29

c) SW 3601

RUN		P1	P2	P5	G2	G3
1	New values	352.0	0.600	845.0	.000	.000
	Treatments	5	5	5	0	0
	S.D.'s	2683	74	3354	0	0
2	New values	.000	.000	.000	824.8	6.88
	Treatments	0	0	0	4	4
	S.D.'s	0	0	0	11708	25

Appendix Table 10 FILEA for validation of CERES-Maize model.

EXP.DATA PLFC9904.MZA PLANTING DATE/3 CULTIVARS

@TRNO	HWAM	HWUM	H#AM	H#UM	LAIX	CWAM	BWAH	ADAT	MDAT	GN%M	CNAM	SNAM	GNAM
1	3257	0.14	2322	438	2.76	10281	-99	29	70	-99	-99	-99	-99
2	3291	0.135	2438	460	2.68	10866	-99	29	72	-99	-99	-99	-99
3	4020	0.165	2430	458	2.67	10422	-99	27	69	-99	-99	-99	-99
4	2392	0.127	1882	355	2.04	11045	-99	88	124	-99	-99	-99	-99
5	2323	0.111	2093	395	2.28	14878	-99	88	126	-99	-99	-99	-99
6	3236	0.135	2324	439	2.03	15775	-99	86	124	-99	-99	-99	-99
7	4686	0.187	2504	473	2.91	12749	-99	112	152	-99	-99	-99	-99
8	4618	0.178	2596	490	2.96	15312	-99	113	154	-99	-99	-99	-99
9	5457	0.202	2708	511	3.23	15205	-99	112	152	-99	-99	-99	-99

Appendix Table 11 FILEX for validation of CERES-Maize model.

*EXP.DETAILS: PLFC9904MZ PLANTING DATE/THREE CULTIVARS IN 1999

*GENERAL

@PEOPLE

SOMCHAI BOONPRADUB

@ADDRESS

PHITSANULOK FCES, PHITSANULOK, THAILAND

@SITE

PHITSANULOK, THAILAND. 16.47 N, 100.16 E

@ PAREA PRNO PLEN PLDR PLSP PLAY HAREA HRNO HLEN HARM.....
 27.0 6 6.0 -99 450 N-S 9.0 4 3.0 HAND HARVEST

*TREATMENTS

-----FACTOR LEVELS-----

@N	R	O	C	TNAME	CU	FL	SA	IC	MP	MI	MF	MR	MC	MT	ME	MH	SM
1	1	0	0	PD1XNS1	1	1	0	0	1	0	1	0	0	0	0	0	1
2	1	0	0	PD1XNSX9210	2	1	0	0	1	0	1	0	0	0	0	0	1
3	1	0	0	PD1XSW3601	3	1	0	0	1	0	1	0	0	0	0	0	1
4	1	0	0	PD2XNS1	1	2	0	0	2	0	2	0	0	0	0	0	2
5	1	0	0	PD2XNSX9210	2	2	0	0	2	0	2	0	0	0	0	0	2
6	1	0	0	PD2XSW3601	3	2	0	0	2	0	2	0	0	0	0	0	2
7	1	0	0	PD3XNS1	1	2	0	0	3	0	3	0	0	0	0	0	3
8	1	0	0	PD3XNSX9210	2	2	0	0	3	0	3	0	0	0	0	0	3
9	1	0	0	PD3XSW3601	3	2	0	0	3	0	3	0	0	0	0	0	3

*CULTIVARS

@C CR INGENO CNAME

1 MZ DA0001 NAKHON SAWAN-1
 2 MZ DA0002 NAKHON SAWAN-72
 3 MZ SW0001 SUWAN 3601

*FIELDS

@L	ID_FIELD	WSTA	FLSA	FLOB	FLDT	FLDD	FLDS	FLST	SLTX	SLDP	ID_SOIL
1	PLFC0001	PLFC9801	-99	0	DR000	0	0	00000	-99	51	IB00610004
2	PLFC0001	PLFC9901	-99	0	DR000	0	0	00000	-99	51	IB00610004

*PLANTING DETAILS

@P	PDATE	EDATE	PPOP	PPOE	PLME	PLDS	PLRS	PLRD	PLDP	PLWT	PAGE	PENV	PLPH
1	98331	-99	5.3	5.3	S	H	75	0	5.0	-99	-99	-99.0	1.0
2	99028	-99	5.3	5.3	S	H	75	0	5.0	-99	-99	-99.0	1.0
3	99057	-99	5.3	5.3	S	H	75	0	5.0	-99	-99	-99.0	1.0

*FERTILIZERS (INORGANIC)

@F	FDATE	FMCD	FACD	FDEP	FAMN	FAMP	FAMK	FAMC	FAMO	FOCD
1	98331	FE002	-99	10	50	-99	-99	-99	-99	-99
1	98361	FE005	-99	10	70	-99	-99	-99	-99	-99
2	99028	FE002	-99	10	50	-99	-99	-99	-99	-99
2	99058	FE005	-99	10	70	-99	-99	-99	-99	-99
3	99057	FE002	-99	10	50	-99	-99	-99	-99	-99
3	99087	FE005	-99	10	70	-99	-99	-99	-99	-99

*SIMULATION CONTROLS

@N	GENERAL	NYERS	NREPS	START	SDATE	RSEED	SNAME					
1	GE	1	1	S	98331	2150	VALIDATION OF CERES-MAIZE					
@N	OPTIONS	WATER	NITRO	SYMBI	PHOSP	POTAS	DISES					
1	OP	Y	Y	Y	N	N	N					
@N	METHODS	WTHR	INCON	LIGHT	EVAPO	INFIL	PHOTO					
1	ME	M	M	E	R	S	C					
@N	MANAGEMENT	PLANT	IRRIG	FERTI	RESID	HARVS						
1	MA	R	A	R	R	M						
@N	OUTPUTS	XCODE	OVVEW	SUMRY	FROPT	GROTH	CAREN	WATER	NITRO	MINER	DISES	LONG
1	OU	N	Y	Y	1	Y	N	Y	Y	N	N	Y

Appendix Table 11 (continue)

```

@ AUTOMATIC MANAGEMENT
@N PLANTING   PFRST PLAST PH2OL PH2OU PH2OD PSTMX PSTMN
 1 PL         155  200   40   100   30   40   10
@N IRRIGATION IMDEP ITHRL ITHRU IROFF IMETH IRAMT IREFF
 1 IR         30   50  100 GS000 IR001  10  0.50
@N NITROGEN   NMDEP NMTHR NAMNT NCODE NAOFF
 1 NI         30   50   25 FE001 GS000
@N RESIDUES   RIPCN RTIME RIDEF
 1 RE         100   1   20
@N HARVEST    HFRST HLAST HPCNP HPCNR
 1 HA         0   365  100   0

*SIMULATION CONTROLS
@N GENERAL    NYERS NREPS START SDATE RSEED SNAME.....
 2 GE         1     1   S 99028  2150 VALIDATION OF CERES-MAIZE
@N OPTIONS    WATER NITRO SYMBI PHOSP POTAS DISES
 2 OP         Y     Y   Y   N   N   N
@N METHODS    WTHER INCON LIGHT EVAPO INFIL PHOTO
 2 ME         M     M   E   R   S   C
@N MANAGEMENT PLANT IRRIG FERTI RESID HARVS
 2 MA         R     A   R   R   M
@N OUTPUTS    XCODE OVVEW SUMRY FROPT GROTH CARBN WATER NITRO MINER DISES LONG
 2 OU         N     Y   Y   1   Y   N   Y   Y   N   N   Y

@ AUTOMATIC MANAGEMENT
@N PLANTING   PFRST PLAST PH2OL PH2OU PH2OD PSTMX PSTMN
 2 PL         155  200   40   100   30   40   10
@N IRRIGATION IMDEP ITHRL ITHRU IROFF IMETH IRAMT IREFF
 2 IR         30   50  100 GS000 IR001  10  0.50
@N NITROGEN   NMDEP NMTHR NAMNT NCODE NAOFF
 2 NI         30   50   25 FE001 GS000
@N RESIDUES   RIPCN RTIME RIDEF
 2 RE         100   1   20
@N HARVEST    HFRST HLAST HPCNP HPCNR
 2 HA         0   365  100   0

*SIMULATION CONTROLS
@N GENERAL    NYERS NREPS START SDATE RSEED SNAME.....
 3 GE         1     1   S 99057  2150 VALIDATION OF CERES-MAIZE
@N OPTIONS    WATER NITRO SYMBI PHOSP POTAS DISES
 3 OP         Y     Y   Y   N   N   N
@N METHODS    WTHER INCON LIGHT EVAPO INFIL PHOTO
 3 ME         M     M   E   R   S   C
@N MANAGEMENT PLANT IRRIG FERTI RESID HARVS
 3 MA         R     A   R   R   M
@N OUTPUTS    XCODE OVVEW SUMRY FROPT GROTH CARBN WATER NITRO MINER DISES LONG
 3 OU         N     Y   Y   1   Y   N   Y   Y   N   N   Y

@ AUTOMATIC MANAGEMENT
@N PLANTING   PFRST PLAST PH2OL PH2OU PH2OD PSTMX PSTMN
 3 PL         155  200   40   100   30   40   10
@N IRRIGATION IMDEP ITHRL ITHRU IROFF IMETH IRAMT IREFF
 3 IR         30   50  100 GS000 IR001  10  0.50
@N NITROGEN   NMDEP NMTHR NAMNT NCODE NAOFF
 3 NI         30   50   25 FE001 GS000
@N RESIDUES   RIPCN RTIME RIDEF
 3 RE         100   1   20
@N HARVEST    HFRST HLAST HPCNP HPCNR
 3 HA         0   365  100   0

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CURRICULUM VITAE

The author was born on January 5, 1962 at Pamok, Ang Thong, Thailand. He completed his elementary education from Watpamok School in 1975, secondary education from Pamok Vitthayapoom School in 1978, and pre-university education from Watmakutkasat School in 1980. He enrolled in Khon Kaen University and graduated with the degree of bachelor of science in Agriculture (First Class Honor) with a major in plant science in 1984.

After October 1, 1984 he served as a government official under the Field Crops Research Institute, Department of Agriculture with the responsibilities to research on maize varietal improvement at Nakorn Sawan Field Crops Research Center. After April 1, 1985 he worked at Phitsanulok Field Crops Experiment Station under the same institute to research on soil and water management including other cultural practices in mungbean and black gram and other potential upland crops for rice-based cropping systems.

From October 26, 1987 to February 26, 1988 he received a grant from the IDRC for training course on varietal improvement of dryland legume crops for rice-based farming systems at IRRI, Loas Banos, Philippines and a two weeks monitoring tour in Java, Indonesia.

In June, 1989 he entered Chiang Mai University to pursue his Master of Science degree in Agriculture with a major in agronomy and graduated in September 1992.

On June 1, 1996, he entered Chiang Mai University to pursue the Doctor of Philosophy degree with a major in agronomy.

During April 26, 1998 to May 26, 1998 he received a grant from CIMMYT as a visiting scientist to visit CIMMYT, Mexico for a period of one month to get acquainted with drought and low -N in maize research work.