RESULTS OF THE INTERNATIONAL CORN DOWNY MILDEW NURSERY

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The International corn *(Zea mays* L.*)* downy mildew nursery was primarily conducted to study intra- and inter-specific virulence patterns within the genus *Sclerospora.* Secondary objectives were to promote cooperation among participating programs, foster the exchange of downy mildew resistant (DMR) corn germplasm and test the reaction of the DMR varietial entries in the Inter-Asian Corn Program (IACP) cooperative yield trials. The nursery was grown annually from 1969 through 1975. The Asian countries were the main participants, but outside of IACP countries, the nursery was grown in the United States of America, Mexico, Argentina, Venezuela, Israel, Papua New Guinea and Zaire when requests were received and the years plant quarantine permitted the entrance of seeds.

Materials and methods. — The nurseries were planned during annual IACP conferences and through letter exchanges and conducted from IACP headquarters. The first Asian corn DMR varieties entered IACP yield trials in 1971 and at that time it was decided to include three types materials in the DM nursery. These were the long term check varieties, new DMR cultivars that appeared promising agronomically and the DMR varieties entered into the yield trials. The results of the nursery were summarized and circulated in mimeograph form to participants and other interested scientists; subsequently they were printed in the annual summary reports of the IACP uniform yield trials.

Sufficient seeds (150-200) were dispatched to plant 3-4 replications of 1-2 row plots each. All seeds of an entry were of a common origin and usually from the country where it was developed. Occasionally remnant seeds from that submitted the proceeding year or seeds from an increase in Thailand was used. In replicated nurseries 80-120 plants were generally tested for each entry. In unreplicated tests 30-50 plants were generally tested. Bogor Synthetic 2, Ph. 9 DMR and Philippine DMRs 1 and 2 were included in the nursery in all 7 years, Tainan DMR composite 1 for 6 years and Lagranja popcorn (DMS) for 5 years. The Philippines program submitted A206, Mimies, Aroman white flint, Ph. 9 DMR, La Granja Popcorn, Tuxpantigua × MIT, UPCA sweet synthetic 1, MIT, MIT-2, Early DMR composites 1 and 2, CBWR composite 1, prolific DMR composite 1 and all entries included in the tables with a "Phil." prefix; Indonesia submitted the Bogor cultivars, Pendjalinan, Genjah Kretek, Genjah Kertas, and number 853; India submitted Gangas 2 and 5, Antiqua 2D, CM 111, CM 105, EPH 100-74 and D 743; Peer Rehovot was from Israel; Taiwan submitted the Tainan cultivars, 2027-3-5 × Ly 22-4 and Ph.9 DMR × Amr. III; CIMMYT contributed Caribbean composite III; Texas, USA the Tx cultivars ; and all of the others cultivars in tables 1-7 were submitted from Thailand's Corn Program. The inbred lines tested in 1974, except T x 441, were selected for DMR for several seasons in Thailand even though two originated in India and five in Taiwan. Also, the variety Philippine DMR 1 (S) C_2, tested in 1975 had undergone two generations of S_1 progeny test for DMR and yield in Thailand.

The data were submitted to an analysis of variance in Bangkok where 3-4 replications were grown and submitted and when average infection was above 15 percent. The participant scientists of the countries which submitted usable data were; M. M. Payak, (New Delhi, Coordinator), M. C. Pandey, Sangam Lal and Jaswant Singh (Pantnagar), S.R.S. Dange and B. S. Siradhana (Udaipur), and K.M. Safeeulla

(Mysore) in India; Rusli Hakim and Amsir Rafin in Indonesia; Carlos De Leon at CIMMYT-Mexico; S.M. Shah and Gopal Rajbhandary in Nepal; O.R. Exconde and Bliss Aday in the Philippines; S.C. Chang and P.M.H. Sun in Taiwan; R.A. Frederiksen and J. Craig in Texas, USA; and, Jarupong Boonlong, Somkiat Titatarn, Udom Pupipat, Kitti Choonhawongse, Banditt Wongsinchaun and Sujin Jinahyon in Thailand. The main diseases involved at the individual test locations were Philippine DM *(Sclerospora philippinensis)* in the Philippines Nepal and Dholi, India; sugarcane DM *(S. sacchari)* in Taiwan and Pantnagar, India; Java DM *(S. maydis)* in Indonesia; and sorghum DM *(S. sorghi)* in Mexico, Thailand, USA, and Coimbatore, Mysore and Udaipur in India. Conidia were the primary sources of inoculum in all tests apart from Mysore, Mexico (Rio Bravo), Udaipur in the earlier years and possibly Coimbatore, and Texas, USA. The 1975 test at Texas A&M University was conducted under controlled greenhouse conditions.

Results. — I had summarized the data through 1973 (1) and supplied it to most of you attending this conference. Joginder Singh (3) subjected that data to regression analyses to attempt to designate the DMR cultivars most stable in performance under varying levels of DM and to possibly identify locations which have similar or dissimilar pathotypes (virulence patterns). He

Table 1. Average percent downy mildew infection in the 1969 International-IACP Nursery.

Pedigree[1]	India	Potzu, Taiwan		Philippines		Mean
	Pantnagar	Aug.	Oct.	Los Banos	Musuan	
A 206*	0	1	2	2	4	2
Mimies	0	0	0	5	5	2
Aroman White Flint	0	4	0	0	8	2
Ph.9 DMR*	0	2	0	10	0.3	3
Phil. DMR 2	0.3	2	3	6	7	4
Phil. DMR 1	0.3	1	4	4	11	4
Tainan DMR 131**	0.3	1	0	9	28	8
Tx 601*	0	3	9	6	47	13
Tainan DMR 1	8	15	12	6	29	14
Ganga 2**	29	35	43	11	34	30
Ganga 5**	47	39	43	18	52	40
Phil. Hyb. 801**	46	51	44	22	36	40
Antigua 2D	54	50	53	21	30	42
Tx 441*	37	84	67	23	43	51
Tainan 5**	48	83	94	28	48	60
Tx 325**	88	96	85	48	77	79
Mean	22	29	29	14	29	25
Bogor Syn. 1	-	5	4	3	-	4
Bogor Syn. 2	-	3	8	6	-	6
Pendjalinan	-	12	14	1	-	9
Tx 127*	-	32	9	17	29	22
L.S.D. (.05)	17.1	17.4	-	15.6	16.3	
(.01)	23.3	23.2	-	20.9	21.9	
C.V. (%)	31.2	31.1	-	72.5	34.6	
No. of replications	3	3	1	3	3	

[1] *Indicates inbred line; ** F_1 hybrid; all others are open-pollinated varieties.

found highly statistically significant differences for DM disease incidence among cultivars and locations for all 5 years and a significant variety × location among data for 1970 and 1971. Cultivars were reported to differ in stability; e.g. Philippine DMR 1 had a low DM infection value and was stable over years and locations, while Ph.9 DMR had a low DM value but was relatively unstable. Singh (3) found "no clear pattern" concerning virulence patterns among these *Sclerospora* incited DM diseases even though the analyses did reveal differences in systemic infection of DM in the corn cultivars in rank correlations among locations. One example of a lower correlation was between the Texas, USA and other locations in 1970. This could be due to a recent finding in the US Department of Agriculture containment laboratory in Maryland (2) which showed that four USA inbred lines were as resistant to a Texas isolate of *S. sorghi* as Philippine DMRs 1, 2, 3, 4 and 5 and two of Thailand's DMR composites but susceptible to the isolates of *S. sorghi*, *S. philippinensis* and *S. sacchari* obtained from Thailand, Philippines and Taiwan, respectively.

The data presented in tables 1-7 reveal no clear proof of differences in virulence either within or between *Scleropora* species. The major factor preventing the detection of differences in virulence patterns was the high error term - note the high coefficient of variation (C.V. %) - experienced in most trials. The ranked differences among locations are ordinarily well within the least significant difference (L.S.D.) value and the few values outside this were most often not found to be exceptions in repeated tests of following years. The comparison of the reaction of the open-pollinated corn populations between years is confounded by the continued increase in DMR, especially the varieties from Thailand, as a result of the annual improvements made in the breeding programs. Since the genes for virulence appear to be the same or quite similar among the species attacking corn in nature in Asia, it allowed cooperative programs and the exchange of resistant material to func-

Table 2. Average percent downy mildew infection in the 1970 International-IACP Nursery.

Pedigree[1]	Taiwan		Philippines		Thailand				Nepal	India		USA	Mexico	Mean
	Potzu Apr.	Potzu Sept.	Musuan	Los Banos	Nakorn Sawan I	II	III	IV	Ram-pur	Pant-nagar	Udai-pur	Texas Ber-clair	Rio Bravo	
Ph.9 DMR*	0	1	31	19	11	4	2	0	6	0	2	1	1	6
Phil. DMR 3	0	2	50	22	3	1	1	0	0	10	7	1	1	8
Phil. Chain Cross DMR	2	0	42	28	3	3	4	0	5	2	6	2	0	8
Tainan DMR 2	1	0	42	22	9	5	3	1	3	0	9	3	0	8
Phil. DMR 1	2	0	53	25	9	4	3	0	1	3	10	6	0	9
Bogor Syn. 2	4	0	64	27	9	1	1	1	8	7	9	7	0	11
Phil. DMR 2	2	5	59	24	16	3	4	5	5	21	7	2	1	12
Tainan DMR 1	9	7	69	43	19	3	6	3	6	16	9	7	0	15
Tx 601*	2	1	96	52	16	6	7	12	4	3	17	0	0	17
Tainan DMR 3	20	3	75	38	26	9	5	1	8	22	14	10	0	18
Tx 441*	43	21	87	61	15	10	4	11	10	88	17	16	7	30
CM 110*	51	28	95	63	35	13	25	18	45	92	33	55	2	43
CM 105*	83	49	93	75	41	22	20	13	12	77	21	52	0	43
Caribbean Comp.	66	35	97	85	63	22	23	13	13	79	39	53	0	45
La Granja Popcorn	90	57	99	93	80	54	43	34	48	100	47	51	3	62
Tainan 5**	80	59	100	95	71	25	25	49	47	92	70	91	0	62
Mean	28	17	72	48	27	12	11	10	14	38	20	22	1	25
Tainan DMR 131**	-	-	-	-	61	25	18	26	-	89	43	85	-	50
Peer Rehovot	83	67	100	92	12	43	36	42	22	100	-	100	0	58
L.S.D. (.05)	15.0	12.2	-	-	13	10	11	15	-	15	19.8	13	-	
(.01)	20.1	16.3	-	-	18	14	14	20	-	20	26.7	18	-	
C.V. (%)	26.8	38.2	-	-	28.1	45.0	50.0	64.6	-	19.7	58.1	28.5	-	
No. of replications	3	3	3	3	3	3	3	3	1	3	3	3		

[1] *Indicates inbred lines; **F_1 hybrid; all others are open-pollinated varieties.

tion. This cooperation and exchange greatly accelerated the National Corn Improvement Programs.

Downy mildew data were generally recorded at 2 and 4 weeks after seeding and at the time of flowering. A much larger percent infection was recorded at 4 weeks than at 2 weeks after planting, but the differences were generally small between the 4 week and flowering dates. Where the percent infection was 95 or greater in the susceptible variety check the 4 week value is presented in tables 1-7 because of the greater array among cultivar means; but, where infection of the check was lower the value at flowering was used.

Sorghum was reported to be regularly infected in the Americas and Southern India by *S. sorghi*, very lightly infected by *S. sorghi* in Thailand and Ludhiana, India; unaffected by the pathotype at Rajasthan (Udaipur) India; and non-infected in Northern India (apart from Ludhiana), Nepal, Taiwan and Indonesia by their prevalent *Sclerospora* species. Significantly, 64 percent infection of the susceptible sorghum varietal entry was recorded in the field planted nursery at Musuan, Philippines in the 1971 nursery (1). The pathogen involved was described to be either *S. philippinensis* or, less likely, *S. sacchari*.

If the nursery is continued in the future efforts should be made to include more homogeneous cultivars, grow larger numbers of heterogeneous cultivars and obtain more uniform infection. These procedures would increase the reliability of the data.

Table 3. Average percent downy mildew infection in the 1971 International-IACP Nursery.

Pedigree[1]	Thailand			Taiwan	Philippines		Indonesia	Mean
	Farm Suwan	Chai-badan	Nakorn Sawan	Potzu	Musuan	Ilagan	Bogor	
Phil. DMR 1	28	31	27	1	85	64	27	38
Phil. DMR 6	24	23	38	3	84	72	29	39
Tuxpantigua-MIT DMR	22	30	33	2	96	76	18	40
Bogor Syn. 2	12	14	37	6	92	89	31	40
Phil. DMR 2	29	28	41	1	81	74	32	41
Ph.9 DMR*	6	37	48	1	100	74	30	42
Phil. DMR 4	34	29	54	5	79	65	38	43
Bogor Syn. 1	18	26	56	6	98	95	35	48
Tainan DMR 1	37	58	98	6	90	90	59	63
Tx 441*	56	29	99	39	100	100	58	69
Tx 601*	79	70	96	6	99	97	50	71
UPCA Sweet Syn. 1	66	80	92	45	98	100	65	78
CM 105*	89	77	100	57	89	100	55	81
Caribbean Comp. (III)	89	93	97	69	100	99	89	91
La Granja Popcorn	94	91	100	81	100	100	81	92
Mean	46	48	68	22	93	86	46	58
L.S.D. (.05)	9.6	17.6	12.2	10.9	17.1	29.7	32.0	
(.01)	12.9	23.7	16.4	14.5	22.9	40.0	43.1	
C.V. (%)	11.5	20.7	9.6	31.5	11.3	21.7	40.6	
No. of replications	3	3	3	4	3	3	3	

[1] *Indicates inbred line; all others are open-pollinated varieties.

Table 4. Average percent downy mildew infection in the 1972 International-IACP Nursery.

Pedigree[1]	Thailand		Taiwan	Indonesia	India	Mean
	Farm Suwan	Nakorn Sawan	Potzu	Bogor	Pantnagar	
Tainan DMR 2	5	35	6	62	5	23
Phil. Chain Cross DMR	8	42	5	65	6	25
Phil. DMR 5	1	58	6	61	6	26
Phil. DMR 1	6	50	8	75	0	28
Ph.9 DMR*	13	44	4	80	6	29
Tuxpantigua × MIT	7	60	10	77	0	31
Phil. DMR 6	7	65	11	83	0	33
Phil. DMR 4	12	59	13	80	5	34
Tainan-CIMMYT DMR 13	2	80	10	81	1	35
Phil. DMR 2	9	76	14	81	8	38
Bogor Syn. 2	7	64	22	83	14	38
2027-3-5 × Ly 22-4**	26	73	8	97	2	41
Tainan DMR 1	12	80	19	83	18	42
Ph.9 DMR × Amr. III**	21	89	24	87	14	47
La Granja Popcorn	61	80	77	100	78	79
Mean	13	64	16	80	11	37
L.S.D. (.05)	15.7	-	8.2	13.8	-	
(.01)	21.1	-	10.9	18.6	-	
C.V. (%)	65.2	-	24.2	10.2	-	
No. of replications	3	3	3	3	1	

[1] *Indicates inbred line; **F_1 hybrid; all others are open-pollinated varieties.

Table 5. Average percent downy mildew infection in the 1973 International-IACP Nursery.

Pedigree[1]	Thailand			Taiwan	Philippines	Indonesia	Mexico	Mean
	Nakorn Sawan	Chai-badan	Farm Suwan	Potzu	Musuan	Bogor	RioBravo	
Phil. DMR 3	15	12	22	3	6	44	17	17
Tainan DMR 2	14	24	21	0	11	39	16	18
Phil. DMR 1	19	25	38	2	11	35	7	20
Phil. DMR 4	20	43	31	0	10	43	6	22
Ph.9 DMR*	17	35	38	0	23	44	3	23
Phil. DMR 2	20	41	42	0	10	44	4	23
Tainan-CIMMYT DMR 13	28	34	57	1	21	45	8	28
Bogor Syn. 2	37	38	69	1	27	68	11	36
Thai DMR Comp. 3	37	51	71	1	20	76	9	38
Tainan DMR 4	46	49	61	2	26	75	20	40
Tainan-CIMMYT DMR 11	57	61	83	10	7	65	16	43
Tainan DMR 10	52	55	68	13	26	77	12	43
Hawaiian Super Sweet	100	100	99	40	68	97	36	77
Mean	36	44	54	6	20	58	13	33
L.S.D. (.05)	13.1	21.1	16.4	10.3	-	-	-	
(.01)	17.5	28.6	-	13.9	-	-	-	
C.V. (%)	22.1	29.3	17.6	59.0	-	-	-	
No. of replications	3	3	3	3	-	-	1	

[1] *Indicates inbred line; all others are open-pollinated varieties.

Table 6. Average percent downy mildew infection in the 1974 International-IACP Nursery.

Pedigree[1]	India						Philippines	Taiwan	Thailand			Mean
	Mysore[2] 1974	Mysore[2] 1975	Coimbatore	Pantnagar	Udaipur	Dholi	Los Banos	Potzu	Nakorn Sawan	Farm Suwan E	Farm Suwan L	
Inbred Lines												
CM 105-3-3-#-#-3-f-#-#-#	0	0	6	1	0	3	35	4	9	–	15	9
Ph.9 DMR	0	0	0	1	0	2	33	2	11	15	22	10
Usatigua F_8-#-#	43	32	0	0	0	0	85	2	8	–	40	17
Narino 330-#-#-6-6-#-2-#-#	0	5	0	1	0	0	84	2	15	36	61	22
Puerto Rico Gr. 1-1-1	18	27	0	1	0	0	82	2	32	29	68	24
Early Caribbean-4-#-#	23	19	3	1	0	0	73	5	29	49	70	26
Eto-1-#-#	0	4	0	0	2	0	71	2	25	49	84	26
Caribbean-Cuba-P. Rico-	21	20	0	1	2	2	95	3	16	–	87	26

Table 6. (Cont'd)

Pedigree[1]	India						Phi-Lip-pines	Tai-wan	Thailand			Mean
	Mysore[2] 1974	Mysore[2] 1975	Coim-batore	Pant-nagar	Udai-pur	Dholi	Los Ba-nos	Pot-zu	Na-korn Sa-wan	Farm Suwan E	Farm Suwan L	
Guad. × Phil.2-#-#												
Tx 441	0	0	4	7	3	3	100	21	59	–	95	37
La Granja Popcorn	10	12	3	24	8	12	100	34	67	96	100	49
Mean	12	12	2	4	2	2	76	8	27	46	64	25
L.S.D. (.05)	–	–	–	–	–	–	18.9	10.2	15.9	–	19.7	
(.01)	–	–	–	–	–	–	25.5	13.8	21.5	–	26.6	
C.V. (%)	–	–	–	–	–	–	18.0	61.2	37.9	–	20.3	
O.P. Varieties												
Phil. DMR 3	0	8	2	0	0	3	32	0	5	15	16	8
Phil. DMR 6	3	12	2	0	0	0	42	0	5	15	15	9
Phil. DMR 5	0	4	2	0	0	0	34	1	10	20	20	10
MIT-2	0	0	3	4	0	5	26	1	5	23	23	10
MIT	0	0	0	0	0	0	46	2	4	28	21	11
Ph.9 DMR*	0	0	0	1	0	2	41	–	17	15	25	13
Phil. Chain Cross DMR	19	12	0	0	0	6	61	4	14	15	17	13
Tainan DMR 2	3	3	2	0	3	0	55	1	19	21	28	14
Genjah Kretek	3	2	1	0	0	0	74	0	22	20	20	15
Phil. DMR 1	0	0	4	0	0	0	55	1	13	33	34	16
Phil. DMR 2	15	15	0	1	2	2	61	2	15	27	33	16
No. 853	11	8	0	0	3	8	59	2	33	25	19	17
Bogor Comp. 13	2	6	0	0	0	5	59	3	24	26	38	17
Genjah Kertas	7	10	0	0	0	2	70	4	30	26	38	19
Thai DMR 7	3	2	2	0	2	1	61	3	32	39	33	19
Thai Comp. 3	0	1	8	14	0	6	64	2	36	29	26	21
Tainan DMR 1	3	4	1	0	0	0	64	4	27	48	51	22
Thai Comp. 1 DMR	0	0	3	1	3	5	74	3	31	54	36	23
Bogor Comp. 10	6	8	4	1	2	3	72	4	31	57	38	24
Bogor Syn. 2	8	10	8	0	5	6	84	1	47	48	28	25
Cup. × Fl. Comp. DMR	0	0	3	1	2	3	75	7	34	56	54	26
Tainan Hyb. 11**	5	4	0	5	0	5	91	6	44	53	63	30
Tainan Hyb. 5**	55	52	17	15	9	14	100	62	87	–	99	50
La Granja Popcorn	10	12	3	24	8	12	100	54	84	100	100	54
Mean	6	7	3	3	2	4	64	7	28	33	37	20
L.S.D. (.05)	–	–	–	–	–	–	15.8	8.6	12.1	18.4	16.4	
(.01)	–	–	–	–	–	–	21.1	11.5	16.4	24.4	21.8	
C.V. (%)	–	–	–	–	–	–	15.1	63.6	28.0	34.8	30.3	
No. of replications	1	1	2	2	2	1	3	4	4	3	3	

[1] * Indicates inbred lines; **F_1 hybrid; all others are open-pollinated varieties.

[2] Oosporic inoculum source, not included in calculation of the mean.

Table 7. Average percent downy mildew infection in the 1975 International-IACP Nursery.

Pedigree[1]	Philippines	Thailand			Taiwan	Texas	India[2]	Mean
	Los Banos	Farm Suwan 1976-L	1975-E	1975-L	Pot-zu	A&M Univ.	Udai-pur	
MIT-2	35	26	15	3	7	11	0.7	16
Thai Comp. 4	37	30	17	1	4	10	–	17
Phil. DMR 1 (S) C_2	38	27	22	5	0	12	–	17
Phil. DMR Comp. 2	34	28	19	2	2	41	–	21
Caribbean Comp. DMR (M) C_1	53	24	18	7	7	21	2.5	22
Guatemala DMR (M) C_1	47	23	24	12	6	25	–	23
MIT	34	31	23	7	0	47	4.4	24
Suwan DMR Source 2	48	22	16	4	6	47	–	24
Caripeno Comp. DMR (M) C_1	55	42	18	1	3	30	3.3	25
Comp. L DMR (M) C_1	51	37	17	3	10	37	7.4	26
Suwan DMR Source 5	51	30	23	5	3	50	–	27
Thai Comp. 3	66	34	20	8	0	35	5.4	27
Phil. DMR 2	53	57	26	9	0	20	1.6	28
Hybrid Comp. DMR	47	37	24	3	6	47	2.1	28
Ph.9 DMR*	66	46	26	4	0	–	6.1	28
Thai DMR 6	62	44	25	2	0	42	–	29
Phil. DMR 1	44	45	53	18	0	23	6.7	31
Cupurico x Fl. Comp. DMR (F) C_2	63	65	34	4	5	15	8.3	31
Thai Comp. 1 DMR BC_3 (S) C_1	64	45	35	7	13	26	18.0	32
Suwan DMR Source 3	65	43	40	5	3	37	8.3	32
Tainan DMR Comp. 2	57	78	23	9	3	26	5.1	33
Phil. DMR 5	29	26	48	16	4	75	2.0	33
Phil. DMR 3	53	16	56	32	33	25	11.9	36
Genjah Kretek	58	77	20	11	3	45	3.5	36
Suwan DMR Source 6	65	47	39	9	6	55	5.9	37
Tainan DMR Comp. 1	61	71	37	10	0	50	6.5	38
Suwan DMR Source 4	69	54	37	10	0	65	–	39
Thai Chain Cross DMR Syn.	84	43	39	4	5	65	7.0	40
Genjah Kertas	64	56	55	14	6	50	5.0	41
Bogor Syn. 2	64	84	55	11	7	39	11.1	43
Early DMR Comp. 2	66	68	51	18	23	45	–	45
Early DMR Comp. 1	61	67	62	13	7	62	–	45
Suwan DMR Source 1	80	56	50	13	14	60	20.3	46
CTP #2	70	76	53	16	14	56	–	48
Thai Super Sweet DMR	70	76	96	42	16	17	–	53
CBWR Comp. 1	68	98	67	15	11	63	20.8	54
Tainan 10	73	57	78	33	20	71	18.2	55
EPH 100-74	73	80	71	24	39	63	28.6	58
Prolific DMR Comp. 1	–	75	65	35	39	80	20.2	59
Tainan 11**	94	93	56	23	37	79	–	64

Table 7. Cont'd

Pedigree[1]	Philippines	Thailand			Taiwan	Texas	India[2]	Mean
	Los Banos	Farm Suwan 1976-L	1975-E	1975-L	Pot-zu	A&M Univ.	Udaipur	
Phil. Sweet DMR Comp. 1	84	75	81	28	45	75	–	65
Suwan DMR Source 7	86	89	84	44	36	65	37.5	67
D 743	92	84	98	48	81	58	40.0	77
Guatemala PB-12	92	99	92	48	60	78	39.8	78
Tainan 5**	100	95	100	80	100	100	–	96
La Granja Popcorn	100	100	100	84	100	100	85.2	97
Mean	64	56	46	18	17	47	14	41
L.S.D. (.05)	16.9	–	16.7	14.5	–	–	11.2	
(.01)	22.4	–	22.2	19.2	–	–	14.9	
C.V. (%)	16.5	–	22.2	48.8	–	–	46.2	
No. of replications	3	1	3	3	–	1	3	

[1] * Indicates inbred line; ** F_1 Hybrid; all others are open-pollinated varieties.
[2] Not included in calculation of the mean of pedigree.

Literature Cited

1. RENFRO, B. L. 1973. Introduction, remarks and five year summary of the international downy mildew nursery. Proc. Ninth Inter – Asian Corn Improv. Workshop, Malaysia. p. 1-13.
2. SCHMITT, CHRIS G., and ROBERT E. FREYTAG. 1977. Response of selected resistant maize genotypes to three species of *Sclerospora*. Plant Dis. Rep. 61: 478-481.
3. SINGH, JOGINDER. 1975. Relative disease reaction of maize varieties to downy mildews over varied environments (based on international downy mildew nursery 1969-1973). Tropical Agric. (Japan) Res. Ser. 8 : 129-152.