

**INTERNATIONAL PEARL MILLET DOWNY MILDEW
DIFFERENTIAL IDENTIFICATION PROGRAM**

(IPMDMDIP)

PROGRESS REPORT: PMPDM8003

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**REPORT OF
THE 1978 AND 1979 PEARL MILLET DOWNY MILDEW DIFFERENTIAL TRIAL
(IPMDMDT)**



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ABSTRACT

The International Pearl Millet Downy Mildew Differential Trial (IPMDMDT) was evaluated in India and West Africa during 1978 (3 locations) and 1979 (5 locations). Seven entries (P-7, P-10, 700651, 700251, 700516, ICI-7530 x 314 EB 21-11, SSC-C x 75) were resistant or moderately resistant at all locations in both years; one entry (7042) was highly susceptible at all locations; and several entries showed variations in reactions among the locations. The entries with differential reactions were classified into several groups based on the pattern of resistance and susceptibility among locations.

RESUME

L'Essai international différentiel pour le mildiou de mil à chandelles (IPMDMDT) a été évalué en Inde ainsi qu'en Afrique de l'Ouest au cours de 1978 (3 emplacements) et de 1979 (5 emplacements). Sept entrées (P-7, P-10, 700651, 700251, 700516, ICI-7530 x 314 EB 21-11, SSC-C x 75) se sont montrées résistantes ou moyennement résistantes à tous les emplacements pour les deux ans; une entrée (7042) a été fortement sensible à tous les emplacements. Les réactions au mildiou (DM) de plusieurs entrées ont varié d'un emplacement à l'autre. Les entrées à réactions différentielles ont été classées en plusieurs groupes selon qu'elles se sont montrées résistantes ou sensibles d'un emplacement à l'autre.

INTRODUCTION

In the 1976 and 1977 multilocational testing program for identification of resistance to pearl millet downy mildew (DM), *Sclerospora graminicola*, several entries showed variation in DM reactions at different locations. Some entries had resistance that was effective at all locations; other entries were highly resistant at one location and highly susceptible at another. Such differences were evident between locations in India and West Africa, and also among West African locations. These variations may be ascribed to variations in the environments and/or in the pathogen populations. Variation in the pathogen populations may be quantitative or qualitative. Knowledge of qualitative variations in pathogenicity is essential for a successful breeding program aiming to produce stable resistance. To accurately classify variable populations of a pathogen, a set of differential hosts is required. In view of this, an International Pearl Millet Downy Mildew Differential Trial (IPMDMDT), containing 22 entries, was initiated in 1978 and sent to cooperators at 5 locations. In 1979, a 25 entry IPMDMDT was sent to cooperators at 6 locations. Results were returned from three locations in 1978 and from five locations in 1979. A brief report of results is presented here.

COOPERATORS AND LOCATIONS

Cooperators and locations in the 1978 IPMDMDT were:

N.V. Sundaram	Samaru	Nigeria
D.P. Thakur	Hissar	India
K.M. Saifeulla	Mysore	India
S.D. Singh	ICRISAT Center	India
S.S. Chahal	Ludhiana	India

Cooperators and locations in the 1979 IPMDMDT were

J.A. Frowd	Koporokeneipe	Mali
J.A. Frowd	Kamboinse	Upper Volta
N.V. Sundaram	Samaru	Nigeria
N.V. Sundaram	Kano	Nigeria
D.P. Thakur	Hissar	India
S.D. Singh	ICRISAT Center	India

No data were received from Mysore and Ludhiana in 1978, nor from Koporokeneipe in 1979.

TEST ENTRIES

Entries included in this trial were inbreds, hybrids and populations selected on the basis of their performance in the 1976 IPMDMN, and the 1977 IPMDMN and PRE-IPMDMN trials. Three types of entries were included; i) resistant at all locations, ii) susceptible at all locations, and iii) entries which gave differential reactions among locations.

NURSERY MANAGEMENT

Cooperators were requested to plant the trial in two replications in a DM nursery with assured high inoculum supply provided by earlier-planted infector rows and/or the use of DM sick-plot. Other details were similar to IPMDMN and PRE-IPMDMN trials.

RESULTS

Three infection parameters were calculated:

1. Percent incidence 30 days after planting (DAP) (% INF 30)
2. Percent incidence at soft dough stage (incidence)
3. A combination of incidence and severity at soft dough stage (severity)

The detailed data for each location by replication including plant

populations, % INF 30, final incidence and severity values are presented in Tables 1 to 3 for 1978 and in Tables 4 to 8 for 1979.

In 1978, plant population was generally adequate at ICRISAT Center, where only 7042 and MBH-110 had less than 30 plants. At Hissar, and Samaru, plant population was also adequate with a few exceptions.

In 1979, plant populations were adequate at ICRISAT Center, Hissar and Kamboinse, and with the exception of 7042, it was adequate at Kano as well. At Samaru most entries had low plant populations and there were large differences between replications for several entries.

DM Pressure at Test Locations During 1978 Rainy Season

ICRISAT Center. DM pressure was severe. No entry was DM free. 7042 developed 96% mean DM incidence. Several entries including BJ-104, MBH-110 and A-836 also showed high DM incidence, ranging from 59 to 95%. (In previous and subsequent tests MBH-110 has not shown more than 15% DM at ICRISAT Center. It appears that the wrong seed had been planted for this entry in 1978).

Hissar. DM pressure was low. SDN-503, P-10 and 700651 were DM free and A-836 showed highest DM incidence (33%). 7042 had 21% mean DM incidence.

Samaru. No entry was DM free. J-1593 had 88% mean DM incidence, and MBH-110, ICH-108, and ICH-105 also showed high DM incidence. 7042 was reported to have only 6% mean DM, probably because most of the DM infected plants of this entry died unnoticed at an early stage (the plant population recorded on this entry in replication 1 was only 3).

DM pressure at Test Locations During 1979 Rainy Season

ICRISAT Center. DM pressure was adequate. 7042, the most susceptible entry, had 94% mean DM followed by Cassady 87-2-2-5 and BJ-104. J-1593, the standard susceptible check, had only 13% DM. P-7, J-2000-1, and 2778-22ME were DM free and 13 additional entries had less than 10% DM.

Hissar. DM pressure was less severe. Fifteen entries were DM free. 7042 had 100% DM incidence followed by Cassady 87-2-2-5. The remaining entries had less than 5% mean DM incidence.

Kamboise. DM pressure was severe. 7042 and Cassady 87-2-2-5 had 100% and 80% DM respectively. NEC-7120 and ICH-107 also were highly DM susceptible. On the remaining entries, DM incidence ranged from 1% to 22%.

Kano. DM pressure was severe. No entry was DM free. 7042 and J-1593 had 100% and 45% DM respectively. On the remaining entries, DM incidence ranged from 4% to 44%.

Samaru. This location provided the highest DM pressure of all the locations tested. No entry was DM free. 7042 had 84% DM. Several other entries including J-1593, ICI-7620-5, 111-B, ICH-105, BD-111, and SC-2 had more than 40% DM incidence.

Performance of Entries Across Location

Across location performance of all promising entries are summarized in Table 9. On the basis of their DM incidence values, entries were classified into following 4 categories:

- | | |
|--------------------------------|-------------------------|
| 1. Resistant (R) | \leq 10% DM incidence |
| 2. Moderately resistant (MR) | 11 to 20% DM incidence |
| 3. Moderately susceptible (MS) | 21 to 30% DM incidence |
| 4. Susceptible (S) | > 30% DM incidence |

On the basis of across-location performance, all entries were divided into 8 groups, A to H. Hissar results are not included here because of considerably low DM pressure in both seasons.

Universally resistant entries (Group A). No entry was DM free at all locations, but 700651 in 1978 and ICI 7530 x 3/4 EB 21-11 in 1979 showed high resistance at all locations. In addition, 700516, 700251, P-10, P-7 and SSC-C x 75 showed resistance or moderate resistance at all locations where they were tested in the two seasons.

Susceptible check entries (Group B). J-1593, the standard susceptible check, was susceptible or moderately susceptible at all locations in both seasons, except at ICRISAT Center in 1979. The highly susceptible check 7042 showed high susceptibility at all locations in both seasons with the exception of Samaru during 1978. As indicated above, this is likely to be an erroneous reaction because of early plant death and this hypothesis is supported by 1979 reaction of this entry at Samaru. BJ-104 was susceptible at ICRISAT Center and at Kano. At Samaru, it was susceptible in 1979 but showed resistance in 1978. At Kamboinse it showed moderate resistance.

Entries with differential reactions. Several entries showed marked differences in the level of DM severity between different locations. These entries, on the basis of their DM reactions, were classified into 6 groups, C to H.

Group C includes those entries which showed moderately susceptible or susceptible reactions at Samaru and at Kano, while at ICRISAT Center and at Kamboinse, they were either resistant or moderately resistant.

111-B, ICI-7620-5, SSC-Hx76 and J-2000-1 were susceptible or moderately susceptible at Samaru but moderately resistant or resistant at other locations with the exception of ICI-7620-5 at Kamboinse in 1979. These entries are included in group D.

Group E includes ICI-107 and NEC-7120 which were susceptible at Kamboinse and resistant or moderately resistant at the other West African locations and at ICRISAT Center in 1979.

NWC-7085 alone was susceptible at ICRISAT Center in 1979 and resistant at all West African locations (Group F).

J-1399 and BD-111 are included in group G. These were susceptible at Samaru and resistant at Kamboinse. At Kano and at ICRISAT Center these were moderately susceptible with the exception of BD-111 at ICRISAT Center in 1979.

Cassady 87-2-2-5 alone represents group H. It showed susceptibility at ICRISAT, and at Kamboinse, while it was moderately susceptible at Samaru and moderately resistant at Kano.

DISCUSSION

The operation of the IPNDMDT in the two seasons allowed the identification of potential differential hosts for the first step in the process of identification of races in pearl millet DM. Reactions of the entries to serve as 'Universal susceptible' and 'Universal resistant' were confirmed. However, entries capable of differentiating variable populations of a pathogen, constitute the most important part of a differential set. Though, no entry

with absolute qualitative differences in DM incidence between locations is available, several entries with wide differences in the level of DM incidence among locations were identified. The consistency of their reactions needed to be confirmed in subsequent trials. If the reactions of these entries are taken as an indication of probable variability in the pathogen, it appears that several races of *S. graminicola* are prevalent in India and Africa.

The representatives of each of the differential groups (Table 9) will be retested at the key DM hot-spot locations in the coming rainy season. However, as this study involves mass field inoculum, and is not subject to the precision of laboratory studies, reactions may vary from one season to the next. The importance of the trial is that it has enabled the identification of entries for use as potential differentials in precise laboratory experiments on pathogenic variability in *S. graminicola* such as the ODA sponsored project at the University of Reading, England.

Table 1. Plant population, downy mildew incidence (%) and severity (%) of 22 entries in the 1978 IPMDMT at ICRISAT Center

Entry	Total Plants		% INF 30		Incidence		Severity	
	R ₁	R ₂	R ₁	R ₂	R ₁	R ₂	R ₁	R ₂
700251	90	121	3	3	3	3	3	2
J-1188	112	106	16	7	16	7	13	5
BJ-104	103	138	59	76	59	76	54	70
23-B	63	83	25	10	25	10	18	8
B-282	85	123	17	6	17	6	13	5
CN-74	134	114	31	13	31	13	25	12
A-836	53	36	87	72	92	74	90	67
ICH-107	76	98	41	27	41	27	30	20
ICH-118	94	72	26	25	26	25	20	19
ICH-105	98	85	3	6	3	6	2	5.
ICH 108	43	34	5	0	5	0	2	0
SSC-C 75	79	104	4	13	4	13	4	10
P-10	118	97	20	7	21	8	16	6
MBH-110	21	29	95	90	95	90	95	90
SDN-503	94	102	23	7	24	8	17	6
P-7	90	101	16	5	15	5	14	5
J-1593	116	121	49	30	49	33	43	27
700651	104	119	7	6	7	6	6	5
700516	92	105	2	4	2	4	1	4
7042	30	11	100	91	100	91	100	91
BD-111	106	87	22	25	22	25	17	22
Ex Bornu-C ₁ Bulk	-	-	-	-	-	-	-	-

Table 2. Plant population, downy mildew incidence (%) and severity (%) of 22 entries in the 1978 IPMDMT at Hissar

Entry	Total Plants		% INF 30		Incidence		Severity	
	R ₁	R ₂	R ₁	R ₂	R ₁	R ₂	R ₁	R ₂
700251	55	40	0	0	2	0	2	0
J-1188	35	39	6	3	6	3	6	1
BJ-104	46	43	7	12	7	12	7	12
23-B	35	19	3	0	3	0	3	0
B-282	45	23	0	17	0	17	0	39
CN-74	41	46	5	4	5	4	5	4
A-836	12	17	42	24	42	24	33	24
ICH-107	29	26	0	12	0	12	0	12
ICH-118	36	48	0	0	0	0	0	2
ICH-105	47	52	0	2	0	2	0	2
ICH-108	14	24	14	0	14	0	14	3
SSC-C-75	40	48	5	2	5	2	5	2
P-10	36	39	0	0	0	0	0	0
MBH-110	12	11	0	18	0	18	0	18
SDN-503	16	49	0	0	0	0	0	0
P-7	37	20	3	0	3	0	3	0
J-1593	35	49	0	2	6	2	2	2
700651	40	39	0	0	0	0	0	0
700516	40	41	3	0	3	0	3	0
7042	6	22	33	9	33	9	25	1
BD-111	44	50	7	8	7	8	7	8
Ex Bornu-C ₁ Bulk	-	-	-	-	-	-	-	-

Table 3. Plant population, downy mildew incidence (%) and severity (%) of 22 entries in the 1978 IPMMDT at Samaru

Entry	Total Plants		% INF 30		Incidence		Severity	
	R ₁	R ₂	R ₁	R ₂	R ₁	R ₂	R ₁	R ₂
700251	54	37	4	0	4	0	2	0
J-1188	42	27	24	15	24	15	18	9
BJ-104	49	46	4	11	4	11	2	5
23-B	50	41	0	24	0	24	0	17
B-282	42	50	14	8	14	9	8	4
CN-74	39	18	28	33	28	33	20	19
A-836	31	43	39	21	39	21	27	13
ICH-107	46	25	4	16	4	16	2	14
ICH-118	38	39	8	5	8	5	7	4
ICH-105	47	18	28	56	27	56	16	42
ICH-108	37	44	32	46	38	46	26	30
SSC-C75	46	47	13	19	13	19	8	12
P-10	50	31	12	16	12	16	7	11
MBH-110	29	30	69	97	69	97	62	91
SDN-503	36	41	56	7	56	7	38	4
P-7	50	46	6	22	6	22	6	12
J-1593	36	39	81	95	81	95	66	67
700651	48	50	8	8	8	8	5	5
700516	46	40	7	8	7	8	4	6
7042	3	37	0	11	0	11	0	8
BD-111	46	44	39	34	39	34	29	21
Ex-Bornu-C ₁ Bulk	44	47	2	2	2	2	1	1

Table 4. Plant population, downy mildew incidence (%) and severity (%) of 25 entries in the 1979 IPMDMT at ICRISAT Center.

Entry	Total Plants		% INF 30		Incidence		Severity	
	R ₁	R ₂	R ₁	R ₂	R ₁	R ₂	R ₁	R ₂
700516	122	105	0	1	0	1	0	<1
700251	116	83	0	1	0	1	0	1
P-7	101	111	0	0	0	0	0	0
J-1593	108	94	7	16	7	18	5	16
J-2000-1	91	94	0	0	0	0	0	0
J-1399	71	88	27	14	31	14	27	11
7042	72	52	93	92	93	94	91	92
2778-22 ME	103	102	0	0	0	0	0	0
IP-2045	93	101	1	0	1	0	<1	0
ICI7530x3/4EB-21-11	90	82	6	9	7	11	6	8
ICI-7620-5	60	86	10	7	10	7	9	6
B-282	100	84	2	2	2	2	2	2
111-B	64	92	5	1	5	1	4	<1
Cassady-87-2-2-5	79	82	43	34	43	38	39	34
ICH-105	88	93	2	0	5	0	4	0
ICH-107	107	102	8	9	8	10	7	8
BD-111	72	76	17	13	17	13	14	13
BJ-104	103	98	38	39	39	39	34	36
GAM-73-7014	98	97	1	0	1	0	<1	0
SSC-Hx76	81	92	10	2	10	2	9	2
MC-P x 76	121	92	<1	1	2	1	<1	<1
NMC-7085	47	53	36	42	36	42	30	34
SC 1 - 7086	85	106	6	15	7	16	6	13
SC-2	89	45	5	13	6	18	5	15
NEC-7120	110	112	5	5	5	7	5	6

Table 5. Plant population, downy mildew incidence (%) and severity (%) of 25 entries in the 1979 IPMENDT at Hissar

ENTRY	Total Plants		% INF 30		Incidence		Severity	
	R ₁	R ₂	R ₁	R ₂	R ₁	R ₂	R ₁	R ₂
700516	128	93	0	0	0	0	0	0
700251	117	112	0	0	0	0	0	0
P-7	107	115	<1	3	<1	3	<1	1
J-1593	131	127	<1	0	2	0	<1	0
J-2000-1	92	116	0	0	0	0	0	0
J-1399	171	103	0	0	0	0	0	0
7042	209	127	96	97	99	100	74	62
2778-22-ME	134	119	0	0	0	0	0	0
IP-2045	185	113	0	0	0	0	0	0
ICI7530xS/4EB-21-11	112	83	0	0	0	0	0	0
ICI-7620-5	193	107	1	0	3	0	2	0
B-282	104	117	0	0	0	0	0	0
111-B	98	126	0	0	0	0	0	0
Cassady-87-2-2-5	98	102	72	20	72	34	56	19
ICH-105	110	102	0	0	0	0	0	0
ICH-107	117	110	0	0	0	0	0	0
BD-111	107	112	<1	3	3	4	1	2
BJ-104	112	125	0	2	0	2	0	<1
GAM-73-7014	127	123	0	0	0	0	0	0
SSC-H x 76	114	103	0	0	0	0	0	0
MC-P x 76	126	104	0	0	0	0	0	0
NWC-7085	108	98	5	6	7	9	4	5
SC1-7086	97	87	0	3	0	6	0	3
SC-2	62	62	0	0	0	0	0	0
NEC-7120	165	118	0	<1	0	<1	0	<1

Table 6. Plant population, downy mildew incidence (%) and severity (%) of 25 entries in the 1979 IPMDNET at Kamboinse

Entries	Total Plants		% INF 30		Incidence		Severity	
	R ₁	R ₂	R ₁	R ₂	R ₁	R ₂	R ₁	R ₂
700516	70	93	0	2	0	5	0	2
700251	80	82	0	2	0	6	0	4
P-7	75	78	0	5	3	9	1	9
J-1593	95	82	18	12	20	23	18	20
J-2000-1	70	79	3	6	9	8	8	8
J-1399	68	66	3	2	4	6	3	4
7042	49	64	90	97	100	100	97	99
2778-22 ME	76	75	1	3	7	3	3	3
IP-2045	87	74	0	0	1	3	<1	3
ICI-7530x3/4EB-21-11	52	67	0	2	0	3	0	3
ICI-7620-5	80	76	8	12	19	22	14	19
B-282	78	57	1	2	7	2	7	2
111-B	70	66	3	0	27	4	21	4
Cassadyx87-2-2-5	64	61	56	77	66	93	61	91
ICH-105	76	60	3	7	7	15	5	13
ICH-107	79	67	17	19	36	39	28	35
BD-111	72	91	3	6	12	8	9	7
BJ-104	82	82	0	16	16	25	7	22
GAM 73-7014	87	70	0	1	1	1	<1	1
SSC-H x 76	59	73	7	7	15	9	11	6
MC-P x 76	69	78	1	1	3	1	1	1
NWC-7085	74	64	3	0	3	2	3	<1
SC1-7086	69	83	13	6	19	14	17	12
SC-2	50	57	6	7	18	11	11	11
NEC-7120	68	80	4	58	31	71	22	68

Table 7. Plant population, downy mildew incidence (%) and severity (%) of 25 entries in the 1978 IPMDMT at Kano

Entry	Total Plants		% INF 30		Incidence		Severity	
	R ₁	R ₂	R ₁	R ₂	R ₁	R ₂	R ₁	R ₂
700516	38	36	8	8	18	17	9	11
700251	41	38	7	0	12	3	10	3
P-7	39	37	8	0	8	8	4	2
J-1593	37	33	8	27	35	55	22	34
J-2000-1	40	38	0	0	5	11	1	3
J-1399	39	35	28	23	31	29	26	19
7042	36	20	94	95	100	100	99	98
2778-22ME	39	37	8	3	33	38	19	16
IP-2045	40	38	13	5	33	11	29	9
ICI-7530x3/4EB-21-11	35	40	6	3	11	8	4	6
ICI-7620-5	40	37	5	5	23	8	19	7
B-282	39	40	3	0	13	5	13	3
111-B	39	38	8	0	8	0	5	0
Cassady-87-2-2-5	38	40	18	10	18	18	16	15
ICH-105	37	40	24	18	38	48	22	18
ICH-107	37	42	16	5	16	8	11	5
BD-111	37	38	3	13	19	37	7	16
BJ-104	37	38	24	13	54	34	32	14
GAM 73-7014	40	43	10	12	23	30	21	21
SSC-Hx76	41	38	10	8	20	13	16	8
MC-P X 76	36	33	19	9	33	27	22	23
NWC-7085	40	38	15	3	18	3	18	3
SC 1 - 7086	37	40	14	13	22	15	22	12
SC-2	35	38	17	16	20	29	15	19
NEC-7120	41	37	7	3	22	8	10	3

Table 8. Plant population, downy mildew incidence (%) and severity (%) of 25 entries in the 1979 IPMNET at Samaru

Entry	Total Plants		% INF 30		Incidence		Severity	
	R ₁	R ₂	R ₁	R ₂	R ₁	R ₂	R ₁	R ₂
700516	17	37	0	5	0	14	0	13
700251	18	34	0	6	17	15	17	14
P-7	6	12	0	0	17	8	17	6
J-1593	35	34	17	6	54	44	52	40
J-2000-1	30	3	7	0	20	33	16	17
J-1399	3	28	0	11	33	29	33	29
7042	6	2	67	0	67	100	67	100
2778-22 ME	20	30	0	10	20	40	16	36
IP-2045	4	26	0	19	25	31	25	31
ICI-7530x3/4EB-21-11	35	31	0	10	0	10	0	10
ICI-7620-5	27	33	7	9	41	42	40	42
B-282	11	45	9	36	18	49	11	47
111-B	4	14	0	57	50	54	50	51
Cassady-87-2-2-5	33	13	12	0	21	31	21	31
ICH-105	33	-	9	-	55	-	47	-
ICH-107	37	5	0	0	11	0	11	0
BD-111	39	43	10	16	54	61	49	54
BJ-104	34	32	3	0	38	50	31	45
GAM 73-7014	4	15	0	7	0	33	0	32
SSC-H x 76	37	24	0	4	12	42	12	33
MC-P x 76	19	34	5	6	47	24	42	19
NMC-7085	35	1	6	0	20	0	16	0
SC-1-7086	-	35	-	6	-	20	-	20
SC-2	33	2	0	0	40	100	32	100
NEC-7120	6	6	0	0	0	33	0	29

Table 9. Summary of downy mildew reactions of promising 1978 and 1979 IPMOMUT entries at ICRISAT Center, Kamboinse, Samaru and Kano.

Entry	Group	ICRISAT Center		Kamboinse		Samaru		Kano	
		78	79	78	79	78	79	78	79
700651	A	R	-	-	-	R	-	-	-
700516		R	R	-	R	R	R	-	MR
700251		R	R	-	R	R	MR	-	R
ICI 7530 x 3/4 EB21-11		-	R	-	R	-	R	-	R
P-10		MR	-	-	-	MR	-	-	-
P-7		R	R	-	R	MR	MR	-	R
SSC-C x 75		R	-	-	-	MR	-	-	-
J-1593	B	S	MR	-	MS	S	S	-	S
7042		S	S	-	S	R	S	-	S
BJ-104		S	S	-	MR	R	S	-	S
ICH-105	C	R	R	-	MR	S	S	-	S
MC-P x 76		-	R	-	R	-	S	-	MS
SC-2		-	MR	-	MR	-	S	-	MS
IP-2045		-	R	-	R	-	MS	-	MS
2778-22ME		-	R	-	R	-	MS	-	S
SDN-503		MR	-	-	-	S	-	-	-
111-B	D	-	R	-	MR	-	S	-	R
ICI-7620-5		-	R	-	MS	-	S	-	MR
SSC-H x 76		-	R	-	MR	-	MS	-	MR
J-2000-1		-	R	-	R	-	MS	-	R
ICH-107	E	S	R	-	S	R	R	-	MR
NEC-7120		-	R	-	S	-	MR	-	MR
NWC-7085	F	-	S	-	R	-	R	-	R
J-1399	G	-	MS	-	R	-	S	-	MS
BD-111		MS	MR	-	R	S	S	-	MS
Cassady 87-2-2-5	H	-	S	-	S	-	MS	-	MR

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