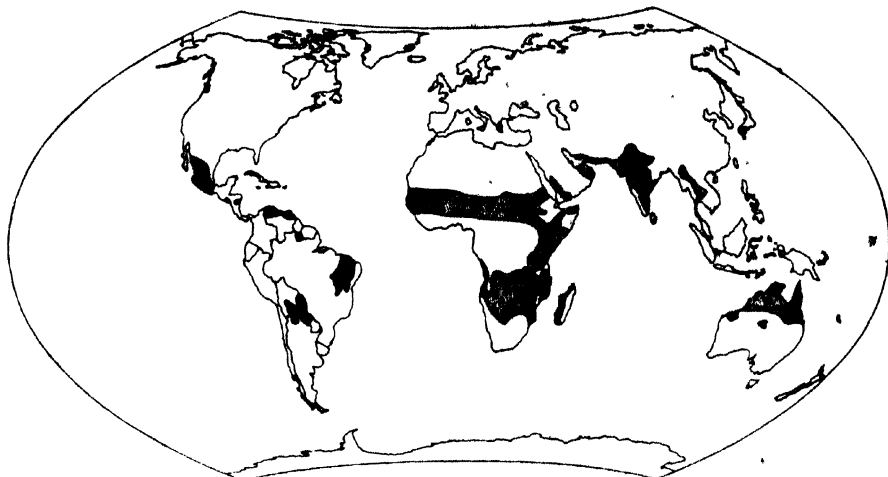


INTERNATIONAL PEARL MILLET DISEASE RESISTANCE TESTING PROGRAM
(IPMDRTP)



REPORT OF
THE NINTH (1984) INTERNATIONAL PEARL MILLET DOWNY MILDEW NURSERY
(IPMDMN)



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ABSTRACT

In the 1984 International Pearl Millet Downy Mildew Nursery (IPMDMN), 45 entries were sent to cooperators for evaluation of reactions to downy mildew (DM) at nine Indian and one African location. Results were received from seven Indian locations. Mysore provided the most severe DM pressure. No entry was DM free at all locations. Twenty two entries developed $\leq 1\%$ DM severity and 18 others had $\leq 5\%$ severity at all locations. These included five entries, 700546-1, E 298-2-1-8-6, EB 83-2-11, SDN 503-12 and P 472-1, that have shown high levels of DM resistance at all locations in India in previous years of testing?

Amongst the new entries, eleven, P 1449-3, P 2880, IP 2084-1, P 2933-1, P 24, P 1596, P 3281-1, P 1591, P 8695-1, IP 8699-3 and IP 6147-4, also performed well and these will be included in the 1985 IPMDMN. 700481-23-2, one of the most promising rust resistant entries, also appears to have good resistance to DM.

RESUME

Les 45 entrées de la Pépinière internationale 1984 du mildiou de petit mil (IPMDMN) ont été expédiées aux coopérateurs à neuf emplacements en Inde et un en Afrique en vue d'évaluer leurs réactions au mildiou. On a reçu des résultats de sept emplacements en Inde. D'après eux, Mysore a connu l'incidence maximale du mildiou. Aucune entrée n'a été exempte de mildiou à tous les emplacements. Vingt-deux entrées ont eu une sévérité de $\leq 1\%$ et une sévérité de $\leq 5\%$ a été observée à tous les emplacements chez 18 autres dont cinq entrées, soit 700546-1, E 298-2-1-8-6, EB 83-2-11, SDN 503-12 et 472-1, qui se sont avérées très résistantes au mildiou à tous les emplacements en Inde dans les essais antérieurs de l'IPMDMN.

Parmi les nouvelles entrées, onze entrées, à savoir, P 1449-3, P 2880, IP 2084-1, P 2933-1, P 1596, P 3281-1, P 1591, P 8695-1, IP 8699-3 et IP 6147-4, ont été également prometteuses et figureront dans les essais IPMDMN de 1985. L'entrée 700481-23-2, l'une des plus prometteuses entrées résistantes à la rouille, a fait preuve d'une bonne résistance au mildiou.

THE 1984 INTERNATIONAL PEARL MILLET DOWNY MILDEW NURSERY (IPMDMN)

INTRODUCTION

The International Pearl Millet Disease Resistance Testing Program (IPMDRTP) was initiated in 1976 with the establishment of the International Pearl Millet Downy Mildew Nursery (IPMDMN). The IPMDMN program is an international cooperative activity through which pearl millet cultivars are tested for degree and stability of resistance to downy mildew (DM). The results of the previous years' IPMDMNs, which were tested by cooperators at 10-16 locations in two to six countries in Africa and Asia, indicated major differences between test entries in the level and stability of DM resistance, and between locations in the aggressiveness and virulence of the DM pathogen (Sclerospora graminicola). As the trial provided valuable information, there was considerable support for it to continue. In 1984, the ninth IPMDMN was distributed to cooperators at nine locations in India and one location, Senegal, in W. Africa. Results were received from seven Indian locations.

TEST LOCATIONS AND COOPERATORS

Details of the test locations and the cooperators are given in Table 1. The locations are representative of Indian locations where DM often occurs in a severe form.

ENTRIES

The trial contained 44 test entries and one trial susceptible check (7042), and a local susceptible check which was NHB 3 at all locations. Cooperators were requested to plant the local susceptible check after every 10 trial entries to act as an "indicator" of local DM pressure. Twenty-four of the 1984 IPMDMN entries were new and had been selected because of their good performance in advanced DM screening at the ICRISAT Center; and 20 entries were the best ones from the 1983 IPMDMN. Four of the 24 new entries were contributed directly by ICRISAT breeders.

DATA RECORDING

The cooperators were requested to record DM data at two stages: i) at approximately 30 days after planting, and ii) at the soft dough stage. The first record was based on incidence (frequency of DM infected plants) and the second was based on a combination of incidence and severity (proportion of plant tissues with disease symptoms).

RESULTS

Detailed results from each location by replication are presented in Tables 2 to 5. Plant population was adequate at all locations for all entries except at Durgapura, where four entries had <30 plants in each replication.

DM Pressure and Performance of Entries at Locations

Across-location performance of entries is presented in Table 8. Entries were ranked on the mean severity values. Though both incidence and severity for all entries have been calculated (Table 2-5) the results are being explained here on the basis of severity values presented in Table 6.

DM pressure, as shown by the trial susceptible check and location mean of test entries, was the highest at Mysore followed by at the ICRISAT Center and Ludhiana. At Mysore five entries (P 1449-3, P 24, (B 282 x 3/4 ExB-100)-11-9-2-2, P 473-4 and 700481-23-2) were DM free and 28 entries developed less than 10% DM severities. Notable among those that developed more than 10% DM at Mysore were ICMV 82116 (52% DM) and ICMV 82117 (16% DM); at all other locations these showed infection indices of 3% or less. At the ICRISAT Center, no entry was DM free but all except four test entries (700512-3, P 615, P 606, and P 2950) had less than 10% DM severities. At Ludhiana, 15 entries developed no DM and all others except two, P 2895-3 (13% DM) and P 2950 (10% DM), developed less than 10% DM severity.

At Kovilpatti, Jamnager, Aurangabad and Durgapura DM pressure was less than adequate. At Kovilpatti, 16 entries were DM free and all others except two, P 615 (12% DM) and P 606 (15% DM), developed less than 10% DM. At Aurangabad, the majority of the entries developed DM but all except two (P 2950 and J 104) had less than 5% DM.

At Jamnagar, 34 entries were DM free and on the remainder, except P 2950 (30% DM), DM severity was less than 5%. Likewise 34 entries were DM free at Durgapura, but on the others DM severity ranged between 1-9%.

Across-Location Performance of Entries:

Twenty two entries developed across-location mean DM severity values of $\leq 1\%$. Eighteen entries had DM severity between 1-5% and the remaining, except P 2950, had $< 10\%$ DM severity. No entry was DM free at all locations and of the 22 entries with $\leq 1\%$ DM severity, none had less than 1% DM severity at all locations. There were 21 entries that developed $< 5\%$ DM severity at all locations and included seven entries (EB 83-2-11, 700546-1, (B 282 x 3/4 ExB-100)-11-9-2-2, E 298-2-1-8-6, (F4FC 1436-4-3-2 x J 104 ST)-1-1-5, P 472-1, and SDN 503-12, which showed similar levels of severity in the 1983 IPMDMN trial. Amongst the 13 other entries from the 1983 IPMDMN, all except three entries, NELC-H 79-4 (Original), P 2672-6, and MPP 7147-2-1-6, which developed 12-16% DM at Mysore, developed less than 10% DM severity at all the seven locations. ICRISAT open pollinated variety WC-C75 also developed less than 5% DM severity at all locations. The worst amongst the newly included entries was P 2950 which developed more than 20% DM at four of the test locations. Notable among the new entries is 700481-23-2, with a maximum of only 6% DM. This entry has high levels of rust resistance also. J 104 (DM resistance version) developed $< 10\%$ at ICRISAT Center, Durgapura, Ludhiana, Jamnagar and Kovilpatti while at Aurangabad and Mysore, it developed 12-13% DM, respectively. The performance of the entries which have been tested in the IPMDMN for the last several years is presented in Table 7.

Several of these have shown a remarkably good level of resistance stability.

A comparison of DM reactions of 23 entries at two locations with high DM pressure in India, ICRISAT Center and Mysore, is presented in Table 8. The 21 test entries that are not included in this table were either DM free or developed less than 3% DM at both the locations and as such do not represent differences in DM pressure. The differences in DM severities of the first 12 entries were within the range of 10% while the remaining 11 entries showed differences from 1 to 52%. In both the categories, the entries with higher DM at Mysore than at ICRISAT Center and vice-versa were present. However, the data clearly reveals that the number of entries with higher DM at Mysore was more than the number of entries that had higher DM at ICRISAT Center. Higher DM severity on many entries at Mysore, though may not present a case for qualitative variability in the pathogen population between the two locations, it indicates that Mysore probably has more DM pressure than ICRISAT Center.

OTHER DISEASES

Records on natural occurrence (unless otherwise stated) of ergot, smut and rust were taken at several locations.

Ergot

Ergot records were taken at ICRISAT Center, Mysore, Aurangabad and Jamnagar. Most severe ergot developed at ICRISAT Center where entries were artificially inoculated, followed by Mysore Table 8. All the test entries except one, IP 6147-4, at Mysore developed moderate

to heavy ergot at both of these locations. Thirteen entries at Aurangabad were reported as ergot free, including 700481-23-2 that possesses high levels of resistance to DM and rust. At Jamnagar no entry was ergot free but all had ergot between 1 and 5%.

Smut

Smut records were taken at ICRISAT Center and Jamnagar. Smut pressure was good at ICRISAT Center where entries were artificially inoculated Table 10. At ICRISAT Center one entry, MPP 7147-2-1-6, was recorded at smut free and five entries, P 1449-3, P 2880, J 104 (DM resistant version), and EB 83-2-11, and IVC-P 8004-2 developed 1% or less smut. There were 10 other entries that developed <10% smut. At Jamnagar all entries had <5% smut.

Rust

Rust records were taken at ICRISAT Center, Jamnagar, Mysore and Aurangabad. Most severe rust was recorded at Mysore followed by ICRISAT Center and Jamnagar Table 11. One entry, IP 8147-4, was free at ICRISAT Center and Aurangabad and had only 5 and 8% rust at the other two locations. There were six other entries including SDN-503-12 which developed more than 10% rust only at Mysore.

DISCUSSION

High levels of DM resistance were detected in many entries and stability of DM resistance was confirmed in several entries including 700548-1, E 298-2-1-8-6, EB 83-2-1, SDN 503-12 and IP 472-1. Eleven new entries, P 1449-3, P 2880, IP 2084-1, P 2933-1, P 24, P 1586,

P 3281-1, P 1591, IP 8695-1, IP 8699-3 and IP 6147-4, performed well with <5% DM at all locations. All of these entries will be included in the 1985 IPMDMN. Many entries have shown similar levels of DM resistance at ICRISAT Center and at Mysore, but the data presented in Table 7 suggests that in 1984 DM pressure was greater at Mysore than at ICRISAT Center.

Like DM, highest rust pressure also occurred at Mysore. However, despite severe rust pressure on the majority of the test entries at this location one entry, IP 6147-4, developed less than 10% rust. This entry was rust free at ICRISAT and Aurangabad and developed only 5% rust at Jamnagar. Most disappointing, however, was the rust reaction of 700481-23-2 which is one of the best entries with stable rust resistance. We need to retest its reaction at Mysore.

Clear differential DM reactions among locations were observed only for one entry, ICMV 82116. This entry was either free or had less than 2% DM severity at all locations except Mysore where it had 52%. However, this represents an average of 9 and 95% figures for the two replications, and the reaction of this entry should be reevaluated.

The performance of J 104 (DM resistant version) is encouraging. Except Mysore and Aurangabad, where it developed 12-13% DM, it was either DM free or had less than 10% DM at all other locations. This confirms our earlier finding with MS 5141A (DM resistant version) that if need arises development of DM resistance can be taken up at any Indian location under severe inoculum pressure to be effective at all locations.

Most encouraging was the performance of WC-C75. This entry was DM free at Ludhiana, Jamnagar and Durgapura and developed only 2-4% DM at other locations. Based on several years of multilocal testing in India, it appears that this variety might have a fairly lasting form of DM resistance.

The 1985 IPMDMN

The IPMDMN will be conducted in 1985 with the selection of the best performing entries from the 1984 IPMDMN and new selections from the best performing germplasm accessions.

Seed Supply

Scientists who would like to receive seed of any entry listed in this report should send request to the Principal Millet Pathologist at ICRISAT (address given on inside back cover of this report) indicating that the request is based on this report of the 1984 IPMDMN.

Table 1. Cooperator(s) and locations in India for the 1984
IPMDMN

Cooperator(s)	Locations
S.S. Chahal	Ludhiana
Govind Singh	Durgapura
S.D. Nafade and H.R. Dave	Jamnagar
N.B. Pawar and S.S. Ghuge	Aurangabad
S.D. Singh and P. Malla Reddy	ICRISAT Center
H. Shekara Shetty	Mysore
V. Ravikumar	Kovilpatti

Table 2. Plant population^a, downy mildew incidence^a (%), and infection severity index^a (%) of entries in the 1984 IPMDMN at Durgapura and Jamnagar

Entry	Durgapura						Jamnagar					
	Total plants		Incidence		Severity		Total plants		Incidence		Severity	
	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2
P 7-4	38	35	0	0	0	0	37	60	0	0	0	0
P 24	42	25	0	0	0	0	74	66	1	0	1	0
P 140	68	30	0	0	0	0	62	72	0	0	0	0
P 310-17	42	41	0	0	0	0	51	64	0	0	0	0
P 472-1	15	17	13	12	5	4	78	67	0	0	0	0
P 473-4	52	36	10	11	4	8	63	57	0	0	0	0
P 606	65	35	0	0	0	0	70	57	0	5	0	5
P 615	42	42	0	0	0	0	36	60	0	0	0	0
P 1449-3	55	35	0	0	0	0	59	70	0	0	0	0
P 1591	60	50	0	0	0	0	62	60	0	0	0	0
P 1596	95	65	3	5	1	4	59	61	0	2	0	2
P 2672-6	63	32	0	0	0	0	34	56	0	0	0	0
P 2880	75	22	0	0	0	0	72	62	0	0	0	0
P 2895-3	65	42	0	0	0	0	61	46	0	0	0	0
P 2933-1	30	42	0	0	0	0	58	50	2	0	2	0
P 2950	67	18	13	17	7	10	50	43	12	49	12	48
P 3281-1	20	20	0	0	0	0	50	78	0	0	0	0
P 3346-1	65	33	0	0	0	0	45	55	0	0	0	0
IP 1930-7	67	55	0	0	0	0	63	56	0	0	0	0
IP 2084-1	25	38	0	5	0	3	58	57	0	0	0	0
IP 6147-4	35	22	0	0	0	0	53	61	0	0	0	0
IP 6695-1	45	45	0	0	0	0	61	58	0	0	0	0
IP 6699-3	65	45	8	0	4	0	63	58	2	0	2	0
700512-3	45	45	4	13	2	11	62	46	0	0	0	0
700546-1	56	61	0	5	0	2	50	51	0	0	0	0
700491-23-2	45	35	0	0	0	0	70	65	0	0	0	0
ICMV 82132	68	35	0	0	0	0	66	74	0	0	0	0
J 104	28	28	0	0	0	0	46	73	0	1	0	1
D 332/1/2-4	35	34	0	0	0	0	68	39	0	0	0	0
E 296-2-1-8-6	67	31	0	0	0	0	70	56	0	0	0	0
EB 83-2-11	52	42	0	0	0	0	59	61	0	0	0	0
MPP 7147-2-1-6	58	48	0	0	0	0	76	70	0	1	0	1
SDN 503-12	76	56	0	0	0	0	59	69	2	0	2	0
WC-C75	77	35	0	0	0	0	73	73	0	0	0	0
ICMV 82113	65	53	0	0	0	0	59	76	0	0	0	0
ICMV 82111	75	68	0	0	0	0	68	68	0	0	0	0
ICMV 82116	45	45	0	0	0	0	71	66	0	0	0	0
ICMV 82117	25	27	0	0	0	0	30	52	0	2	0	2
IVC-P 78-2	96	26	0	0	0	0	54	75	0	0	0	0
IVC-P 8004-2	68	53	9	8	5	6	59	53	0	0	0	0
NELC-H 79-4 (Original)	40	52	0	10	0	8	71	54	0	0	0	0
SSC 88 78-4 (Reconstituted)	45	30	0	0	0	0	66	72	0	0	0	0
(B 282 x 3/4 ExB-100) -11-8-2-2	34	48	0	0	0	0	55	64	0	0	0	0
(F4FC 1436-4-3-2 x J 104 ST)-1-1-5	72	32	0	0	0	0	67	58	0	0	0	0
Location mean for test entries	54	39	3	2	1	1	59	61	1	2	1	2
Trial susceptible check (7042)	76	26	53	0	32	0	58	43	43	49	38	36
Local susceptible check (NHB 3) ^b	33	29	13	13	5	9	58	60	56	48	44	37

^a Figures were "Rounded-off" to the nearest whole number.^b Mean of five plots in each replication.

Table 3. Plant population^a, downy mildew incidence^a (%), and infection severity index^a (%) of entries in the 1984 IPMDMN at Aurangabad and Kovilpatti

Entry	Aurangabad						Kovilpatti					
	Total plants		Incidence		Severity		Total plants		Incidence		Severity	
	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2
P 7-4	61	79	2	0	2	0	59	68	19	0	16	0
P 24	78	79	0	0	0	0	53	66	0	5	0	2
P 140	66	75	3	0	3	0	71	72	1	4	1	3
P 310-17	62	80	0	0	0	0	70	71	0	0	0	0
P 472-21	71	75	0	0	0	0	64	63	0	0	0	0
P 473-4	62	77	0	0	0	0	48	66	0	5	0	2
P 806	80	70	3	1	1	1	75	68	21	19	15	15
P 815	54	69	6	1	6	1	52	70	25	6	19	5
P 1449-3	67	83	1	0	<1	0	60	68	0	3	0	1
P 1591	66	80	0	0	0	0	50	70	0	3	0	1
P 1598	74	78	0	0	0	0	56	69	0	1	0	<1
P 2672-8	57	75	0	3	0	3	56	68	4	4	4	2
P 2680	74	67	0	0	0	0	45	69	0	0	0	0
P 2895-3	67	90	0	0	0	0	63	68	5	0	5	0
P 2933-1	40	67	0	0	0	0	57	70	0	0	0	0
P 2950	69	75	19	24	19	23	48	70	0	0	0	0
P 3281-1	65	83	5	0	2	0	62	60	0	0	0	0
P 3346-1	71	66	0	0	0	0	43	65	0	0	0	0
IP 1930-7	59	70	0	0	0	0	70	71	1	1	1	1
IP 2084-1	58	87	0	0	0	0	56	60	0	0	0	0
IP 6147-4	78	80	0	1	0	1	65	69	6	4	5	3
IP 6695-1	56	84	0	0	0	0	70	67	0	0	0	0
IP 6699-3	63	66	2	2	<1	2	62	67	0	1	0	<1
700512-3	73	64	11	0	10	0	59	68	3	1	3	1
700546-1	62	79	0	1	0	1	66	67	0	0	0	0
700481-23-2	66	83	0	0	0	0	47	71	15	3	11	2
ICMV 82132	76	58	0	0	0	0	65	71	0	4	0	2
J 104	44	55	11	13	11	13	45	70	0	6	0	5
O 332/1/2-4	70	72	0	0	0	0	65	63	0	0	0	0
E 298-2-1-8-6	78	85	0	1	0	1	58	68	7	3	5	2
EB 83-2-11	66	84	0	0	0	0	70	68	0	0	0	0
MPP 7147-2-1-8	84	66	0	0	0	0	44	68	2	10	2	9
SDN 503-12	65	81	6	1	6	1	62	69	0	1	0	1
WC-C75	65	68	0	4	0	4	65	66	0	3	0	2
ICMV 82113	55	69	2	0	2	0	53	69	0	4	0	3
ICMV 82111	69	80	0	1	0	1	62	71	6	0	6	0
ICMV 82116	43	77	0	1	0	1	37	66	0	0	0	0
ICMV 82117	69	60	1	2	1	1	50	68	4	6	4	3
IVC-P 78-2	70	93	0	0	0	0	70	69	0	4	0	2
IVC-P 8004-2	76	77	1	0	<1	0	42	70	7	9	2	6
NELC-H 78-4 (Original)	68	66	1	0	1	0	61	58	2	0	2	0
SSC 88 78-4 [Reconstituted] (B 282 x 3/4 ExB-100) -11-8-2-2	56	80	0	0	0	0	58	71	0	0	0	0
(F4FC 1438-4-3-2 x J 104 ST)-1-1-5	75	84	0	0	0	0	45	66	0	0	0	0
81	75	2	0	2	0	0	48	70	0	0	0	0
Location mean for test entries	66	76	2	2	2	1	57	68	4	3	3	2
Trial susceptible check (7042)	75	88	27	13	27	12	52	68	38	37	29	32
Local susceptible check (NHB 3) ^b	58	66	56	44	54	41	54	70	45	48	41	43

^a Figures were "Rounded-off" to the nearest whole number except <1.

^b Mean of five plots in each replication.

Table 4. Plant population^a, downy mildew incidence^a (%), and infection severity index^a (%) of entries in the 1984 IPMDMN at Ludhiana and ICRISAT Center

Entry	Ludhiana						ICRISAT Center					
	Total plants		Incidence		Severity		Total plants		Incidence		Severity	
	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2
P 7-4	61	68	5	3	3	3	180	180	3	1	3	1
P 24	64	64	0	2	0	1	192	149	2	1	2	1
P 140	78	70	0	3	0	1	346	135	5	5	5	5
P 310-17	78	66	0	0	0	0	146	173	1	2	1	2
P 472-1	65	68	0	0	0	0	593	184	1	1	1	1
P 473-4	73	64	3	3	1	2	186	185	0	2	0	2
P 606	71	65	6	11	3	6	368	174	37	5	33	5
P 615	68	60	3	7	2	5	172	149	20	19	20	19
P 1449-3	89	85	0	0	0	0	155	180	1	0	1	0
P 1591	71	70	0	0	0	0	207	190	1	1	1	1
P 1596	67	78	0	0	0	0	563	178	1	1	1	1
P 2672-6	59	62	0	3	0	3	188	174	3	0	3	0
P 2880	70	72	3	0	2	0	168	175	2	2	2	2
P 2885-3	69	63	19	22	11	14	333	180	5	1	5	1
P 2933-1	62	75	0	1	0	1	164	179	3	1	3	1
P 2950	53	76	19	8	12	7	176	174	35	33	35	32
P 3281-1	68	70	0	0	0	0	227	144	1	1	1	1
P 3346-1	70	72	4	6	4	5	177	170	2	1	2	1
IP 1930-7	69	72	6	3	3	1	187	186	4	1	4	1
IP 2084-1	72	73	3	0	1	0	181	173	2	1	2	1
IP 8147-4	74	68	0	0	0	0	489	183	1	2	1	2
IP 8695-1	71	68	1	4	1	2	244	198	1	1	1	1
IP 8699-3	66	68	0	0	0	0	508	171	2	1	2	1
700512-3	63	58	3	7	2	3	299	182	10	12	10	12
700546-1	73	70	4	3	3	1	178	176	2	2	2	2
700481-23-2	71	60	11	7	8	5	173	167	1	1	1	1
ICMV 82132	72	73	0	0	0	0	690	212	1	1	1	1
J 104	64	60	9	13	7	10	192	177	2	2	2	2
D 332/1/2-4	70	60	0	0	0	0	535	169	1	0	1	0
E 298-2-1-8-6	80	68	6	6	3	4	169	180	2	2	2	2
EB 83-2-11	74	70	5	3	3	1	176	179	1	1	1	1
MPP 7147-2-1-6	73	75	5	9	5	8	145	190	4	4	4	4
SDN 503-12	80	58	0	0	0	0	181	146	2	2	2	2
WC-C75	73	70	0	0	0	0	142	183	2	2	2	2
ICMV 82113	64	62	6	6	4	3	236	198	2	2	2	2
ICMV 82111	75	72	0	0	0	0	185	202	1	3	1	3
ICMV 82116	70	72	0	0	0	0	174	185	2	1	2	1
ICMV 82117	62	64	3	5	3	4	170	179	5	2	5	2
IVC-P 78-2	75	76	0	0	0	0	393	181	10	5	10	5
IVC-P 8004-2	64	71	0	1	0	1	426	157	11	1	11	1
NELC-H 79-4 (Original)	74	73	1	4	1	3	213	177	3	2	3	2
SSC 88 78-4												
[Reconstituted]	78	72	3	4	2	1	508	157	8	10	8	10
(B 282 x 3/4 ExB-100)												
-11-9-2-2	71	68	8	4	7	3	198	198	1	1	1	1
(F4FC 1438-4-3-2 x												
J 104 ST)-1-1-5	71	66	3	3	1	2	180	212	1	3	1	3
Location mean for test entries	70	68	5	5	3	4	266	177	7	5	6	4
Trial susceptible check (7042)	67	65	82	80	59	81	293	193	89	72	84	61
Local susceptible check (NMB 3) ^b	62	62	84	88	52	59	295	288	97	98	94	97

^a Figures were "Rounded-off" to the nearest whole number.

^b Mean of five plots in each replication.

Table 5. Plant population^a, downy mildew incidence^a (%), and infection severity index^a (%) of entries in the 1984 IPMDMN at Mysore

Entry	Mysore					
	Total plants		Incidence		Severity	
	R1	R2	R1	R2	R1	R2
P 7-4	207	192	18	5	14	4
P 24	272	222	0	0	0	0
P 140	226	193	17	8	11	5
P 310-17	198	273	20	4	14	3
P 472-1	342	205	6	7	5	6
P 473-4	142	276	0	0	0	0
P 606	162	145	25	18	15	12
P 615	172	132	26	14	18	9
P 1448-3	138	230	0	0	0	0
P 1591	157	298	11	4	8	3
P 1596	310	292	2	1	1	<1
P 2672-6	164	184	29	12	23	9
P 2880	148	238	0	1	0	<1
P 2895-3	276	270	22	16	17	11
P 2933-1	122	215	0	1	0	<1
P 2950	193	265	54	23	42	18
P 3281-1	289	198	14	3	7	2
P 3348-1	198	198	21	14	15	10
IP 1930-7	221	186	19	2	11	2
IP 2084-1	179	284	0	1	0	<1
IP 6147-4	251	252	8	8	6	4
IP 8695-1	284	310	14	2	7	1
IP 8699-3	340	225	7	3	6	2
700512-3	286	238	12	4	6	3
700548-1	213	247	0	1	0	<1
700481-23-2	219	247	0	0	0	0
ICMV 82132	324	281	17	5	12	3
J 104	132	183	24	17	16	10
D 332/1/2-4	291	268	7	0	6	0
E 298-2-1-8-8	232	331	0	1	0	<1
EB 83-2-11	255	220	3	2	3	1
MPP 7147-2-1-8	251	289	27	12	21	8
SDN 503-12	240	258	12	1	9	1
WC-C75	211	231	7	5	4	4
ICMV 82113	383	158	6	13	4	8
ICMV 82111	165	241	2	4	2	2
ICMV 82116	132	215	9	13	35	9
ICMV 82117	208	201	22	23	16	16
IVC-P 78-2	203	211	0	1	0	1
IVC-P 8004-2	250	240	1	1	<1	<1
NELC-H 79-4 (Original)	142	305	19	12	15	9
SBC 88 78-4 (Reconstituted)	338	308	16	2	10	1
(B 282 x 3/4 Ex8-100)-11-9-2-2	178	181	0	0	0	0
(F4FC 1436-4-3-2 x J 104 ST)-1-1-5	192	208	8	7	7	5
Location mean for test entries	223	233	15	8	12	8
Trial susceptible check (7042)	198	152	90	91	81	70
Local susceptible check (NHB 3) ^b	217	172	96	93	89	82

^a Figures were "Rounded-off" to the nearest whole number except <1.

^b Mean of five plots in each replication.

Table 6. Mean percentage downy mildew infection severity index (%) of entries in the 1984 IPMDMN at each of seven locations and the overall mean severity index (%)

Entry	Locations ^a							Mean ^a severity index
	1	2	3	4	5	6	7	
P 1449-3	0	0	<1	1	0	1	0	<1
P 2880	0	0	0	0	1	2	<1	<1
D 332/1/2-4	0	0	0	0	0	<1	3	<1
IP 2084-1	1	0	0	0	<1	1	<1	<1
P 2933-1	0	1	0	0	1	2	<1	1
P 24 ^c	0	1	0	1	<1	2	0	1
EB 83-2-11	0	0	0	0	2	1	2	1
P 1598	3	1	0	<1	0	1	<1	1
700548-1	1	0	1	0	2	2	<1	1
(B 282 x 3/4 ExB-100)-11-8-2-2	0	0	0	0	5	1	0	1
P 3281-1	0	0	1	0	0	1	4	1
P 1591	0	0	0	1	0	1	5	1
IP 8695-1	0	0	0	0	1	1	4	1
ICMV 82111	0	0	1	3	0	2	2	1
IVC-P 78-2	0	0	0	1	0	7	<1	1
IP 8699-3	2	1	1	<1	0	1	4	1
WC-C75	0	0	2	1	0	2	4	1
E 298-2-1-8-6	0	0	1	4	4	2	<1	1
ICMV 82132	0	0	0	1	0	1	8	1
P 310-17	0	0	0	0	0	2	8	1
P 473-4	6	0	0	1	2	1	0	1
(F4FC 1436-4-3-2 x J 104 ST)1-1-5	0	0	1	0	2	2	6	1
IP 8147-4	0	0	1	4	0	2	5	2
P 472-1	5	0	0	0	0	1	5	2
SDN 503-12	0	1	4	1	0	2	5	2
IP 1930-7	0	0	0	1	2	2	7	2
ICMV 82113	0	0	1	1	3	2	6	2
700481-23-2	0	0	0	6	6	1	0	2
IVC-P 8004-2	5	0	<1	4	<1	6	<1	2
SSC 88 78-4 (Reconstituted)	0	0	0	0	1	9	6	2
P 140	0	0	2	2	1	5	8	2
P 3346-1	0	0	0	0	4	2	13	3
NELC-H 79-4 (Original)	4	0	<1	1	2	3	12	3
P 7-4	0	0	1	8	3	2	9	3
P 2672-8	0	0	1	3	1	1	16	3
ICMV 82117	0	1	1	3	3	3	16	4
MPP 7147-2-1-6	0	1	0	6	6	4	14	4
700512-3	6	0	5	2	2	11	4	4
P 2895-3	0	0	0	2	13	3	14	5
J 104	0	1	12	3	8	2	13	5
P 815	0	0	4	12	3	20	13	7
ICMV 82116	0	0	<1	0	0	1	52	8
P 606	0	3	1	15	4	19	14	8
P 2950	9	30	21	0	10	34	30	19
Location mean for test entries	1	2	2	3	3	5	9	4
Trial Susceptible check (7042)	16	37	19	30	60	73	76	44
Local Susceptible check (NHB 3) ^c	7	41	48	42	56	95	85	48

^a Figures were "Rounded-off" to the nearest whole number except <1.

^a 1 Durgapura; 2 Jamnagar; 3 Aurangabad; 4 Kovilpatti; 5 Ludhiana; 6 ICRISAT Center; 7 Mysore.

^b Means calculated before the figures were "Rounded-off".

^c

Mean of ten plots from two replications.

Table 7. Performance of 26 entries and standard susceptible checks included in the IPMIDAT trial for 2-9 years and at all locations of testing in India and Africa

Entry	Origin	Mean severity (%)									
		'76	'77	'78	'79	'80	'81	'82	'83	'84	
SUN 503	Nigeria	1(0-2)	1(0-8)	3(0-10)	3(0-14)	8(0-29)	9(<1-53)	8(0-21)	1(0-5)	2(0-5)	
P 7	Mali	6(0-38)	2(0-11)	3(0-12)	3(0-9)	9(0-38)	6(0-48)	6(0-22)	3(0-19)	3(0-9)	
700251	Nigeria	3(0-23)	2(0-9)	2(0-11)	1(0-5)	9(<1-30)	6(0-33)	6(0-35)	4(0-19)	-	
700516	Nigeria	2(0-26)	3(0-35)	2(0-12)	1(0-6)	7(0-30)	5(0-32)	3(0-10)	3(0-15)	-	
700651	Nigeria	1(0-12)	3(0-28)	4(0-29)	1(0-3)	10(0-35)	6(0-47)	4(<1-18)	3(0-18)	-	
SUN 347-1	Nigeria	5(0-26)	3(0-16)	4(0-24)	3(0-14)	-	-	-	-	-	
BJ 104	New Delhi	-	14(0-42)	-	13(1-48)	21(6-43)	10(0-37)	17(0-58)	-	-	
EB 18-3-1	ICRISAT	-	-	2(0-14)	1(0-8)	7(<1-26)	2(0-11)	-	-	-	
IP 1930	ICRISAT	-	-	-	2(0-9)	8(0-25)	2(0-15)	1(0-10)	2(0-9)	2(0-7)	
BB 83-2	ICRISAT	-	-	-	2(0-6)	6(0-25)	5(0-23)	3(0-18)	4(0-18)	1(0-2)	
MP 7147-2-1	New Delhi	-	-	-	1(0-4)	7(<1-34)	5(0-22)	6(0-18)	4(0-16)	4(0-14)	
E 298-2-1-8	ICRISAT	-	-	-	-	5(0-27)	3(0-27)	4(0-16)	3(0-10)	1(0-4)	
700546	Nigeria	-	-	-	-	7(0-25)	6(0-38)	7(0-26)	5(0-31)	1(0-2)	
700512	Nigeria	-	-	-	-	6(0-24)	3(0-16)	3(0-12)	5(0-24)	4(0-11)	
SUN-714	Nigeria	-	-	-	-	6(0-35)	6(0-39)	4(0-19)	5(0-20)	-	
IP 2058	Nigeria	-	-	-	1(0-5)	9(0-30)	8(0-43)	5(0-19)	-	-	
P 310-17	Mali	-	-	-	-	-	-	-	1(0-4)	1(0-8)	
P 472-1	Mali	-	-	-	-	-	-	-	1(0-5)	2(0-5)	
P 473-4	Mali	-	-	-	-	-	-	-	3(0-20)	1(0-6)	
P-2672-6	Niger	-	-	-	-	-	-	-	4(0-20)	3(0-16)	
IVC-P-78-2	ICRISAT	-	-	-	-	-	-	-	6(0-34)	1(0-7)	
IVC-P-8004-2	ICRISAT	-	-	-	-	-	-	-	8(0-43)	2(0-6)	
NEUC-H79-4	ICRISAT	-	-	-	-	-	-	-	6(0-31)	3(0-12)	
(Original)	ICRISAT	-	-	-	-	-	-	-	2(0-15)	2(0-9)	
SSC BB 78-4	ICRISAT	-	-	-	-	-	-	-	6(0-48)	1(0-5)	
(Reconstituted)	ICRISAT	-	-	-	-	-	-	-	-	-	
(8 282 x 3/4 E+B	ICRISAT	-	-	-	-	-	-	-	-	-	
-100)-11-9-2-2	ICRISAT	-	-	-	-	-	-	-	-	-	
(JAPC 1436-4-3-2	ICRISAT	-	-	-	-	-	-	-	8(0-46)	1(0-6)	
xJ 1045T)-1-1-5	ICRISAT	-	-	-	58(30-91)	63(15-98)	68(8-100)	44(9-87)	64(14-100)	44(18-76)	
7042a	Chad	-	-	-	8(0-27)	17(0-54)	15(0-56)	-	-	-	
J-1593a	Jamagar	-	28(4-78)	14(0-38)	-	-	-	-	-	-	

a Standard susceptible checks.

Figures in parentheses are severity range across locations.

Table 8. Comparison of downy mildew reactions of selected entries of the 1984 IPMDMN at ICRISAT Center and Mysore

Entry	ICRISAT Center	Mysore
P 7-4	2	9
P 140	5	8
P 310-7	2	8
P 472-1	1	6
P 1591	1	5
IP 1930-7	2	7
ICMV 82132	1	8
ICMV 82113	2	6
[F4FC 1436-4-3-2 x J 104 ST]-1-1-5	2	6
IVC-P-78-2	7	<1
IVC-P 8004-2	6	<1
SSB BB 78-4 (Reconstituted)	<1	6
P 606	19	14
P 615	20	13
P 2950	34	30
700512-3	11	5
P 2672-6	2	16
P 2895-3	3	14
P 3346-1	2	13
J 104	2	13
MPP 7147-2-1-1-6	4	14
ICMV 82116	1	52
ICMV 82117	3	16
Location mean for test entries	5	9
Trial susceptible check (7042)	73	76
Local Susceptible check (NHB 3)	96	85

Table 8. Percent ergot severity^a in the 1984 IPMDMN at four locations

Entry	Locations			
	Jam- nagar	Mysore	Auren- gabed	ICRISAT Center
P 7-4	3	35	3	70
P 24	3	17	5	48
P 140	2	17	0	51
P 310-17	1	43	0	37
P 472-1	1	50	3	44
P 473-4	2	63	5	65
P 606	2	50	5	64
P 615	3	17	0	82
P 1448-3	3	43	3	57
P 1591	1	35	0	-
P 1596	2	25	3	82
P 2672-6	2	43	3	57
P 2880	2	50	3	54
P 2895-3	2	50	5	65
P 2933-1	2	43	0	36
P 2950	1	35	5	68
P 3281-1	1	43	5	23
P 3346-1	1	35	3	26
IP 1930-7	2	43	5	66
IP 2084-1	3	55	0	52
IP 6147-4	1	5	0	65
IP 8685-1	2	55	0	67
IP 8689-3	1	55	0	67
700512-3	1	75	3	70
700546-1	4	35	3	57
700481-23-2	1	50	0	43
ICMV 82132	2	50	8	47
J 104	1	17	3	29
D 332/1/2-4	3	50	0	54
E 298-2-1-8-6	4	25	5	54
EB 83-2-11	3	35	8	70
MPP 7147-2-1-6	2	75	5	53
SDN 503-12	2	50	5	55
WC-C75	4	43	5	25
ICMV 82113	3	50	5	61
ICMV 82111	4	43	5	36
ICMV 82116	2	50	5	54
ICMV 82117	3	43	5	40
IVC-P 78-2	2	63	5	51
IVC-P 8004-2	2	43	0	32
NELC-H 78-4 (Original)	5	43	5	35
SSC 88 78-4 (Reconstituted)	1	43	0	47
(B 282 x 3/4 Ex8-100) -11-8-2-2	1	43	5	39
(F4FC 1436-4-3-2 x J 104 ST)-1-1-5	5	43	5	45
Location mean for test entries	2	43	3	52
Trial susceptible check (7042)	5	50	5	87
Local susceptible check (NHB 3) ^b	3	50	5	67

^a Figures were "Rounded-off" to the nearest whole number.^b Each datum is the heads mean of five plots in each replication.

Natural inoculation at all locations except ICRISAT Center where heads
were spray inoculated

Table 10. Percent smut severity^a in the 1984 IPMDMN at two locations

Entry	Locations	
	ICRISAT	Jamnagar
P 7-4	9	2
P 24	25	1
P 140	35	1
P 310-17	8	1
P 472-1	22	2
P 473-4	27	3
P 606	18	3
P 615	46	2
P 1448-3	<1	1
P 1591	18	2
P 1596	15	1
P 2872-6	26	4
P 2880	1	1
P 2895-3	2	0
P 2933-1	2	0
P 2950	36	1
P 3291-1	5	1
P 3346-1	18	2
IP 1930-7	5	1
IP 2084-1	25	1
IP 8147-4	10	1
IP 8695-1	51	2
IP 8699-3	33	2
700512-3	4	2
700546-1	11	1
700481-23-2	8	1
ICMV 82132	4	2
J 104	<1	1
D 332/1/2-4	17	0
E 298-2-1-8-6	37	2
EB 83-2-11	<1	1
MPP 7147-2-1-6	0	0
SDN 503-12	9	2
WC-C75	11	1
ICMV 82113	11	2
ICMV 82111	18	2
ICMV 82116	10	1
ICMV 82117	14	1
IVC-P 78-2	34	1
IVC-P 8004-2	1	2
NELC-H 79-4 (Original)	10	2
SSC 88 78-4 (Reconstituted)	25	1
(B 282 x 3/4 ExB-100)-11-9-2-2	15	1
(F4FC 1436-4-3-2 x J 104 ST)-1-1-5	15	5
Location mean for test entries	16	2
Trial susceptible check (7042)	42	4
Local susceptible check (NHB 3) ^b	58	1

^a Figures were "Rounded-off" to the nearest whole number except <1.^b Mean of five plots in each replication.

Table 11. Percent rust severity^a in the 1984 IPMDMN at four locations

Entry	Locations			
	ICRISAT Center	Jam- nagar	Mysore	Auran- gabad
P 7-4	53	60	53	10
P 24	33	18	45	5
P 140	3	15	25	5
P 310-17	15	8	53	0
P 472-1	8	18	25	5
P 473-4	18	30	53	0
P 666	10	20	65	0
P 615	0	18	18	0
P 1448-3	0	15	53	0
P 1581	0	5	40	0
P 1596	3	5	23	5
P 2672-6	15	23	33	0
P 2880	18	8	53	0
P 2895-3	8	13	40	0
P 2933-1	25	23	65	10
P 2950	10	25	40	5
P 3281-1	33	48	45	0
P 3346-1	40	28	45	10
IP 1930-7	25	10	53	0
IP 2084-1	3	8	53	0
IP 8147-4	0	5	8	0
IP 8685-1	0	5	53	0
IP 8688-3	5	13	35	0
700512-3	33	18	40	10
700546-1	18	20	40	5
700481-23-2	10	18	53	0
ICMV 82132	10	25	65	0
J 104	8	33	25	10
D 332/1/2-4	5	3	53	0
E 298-2-1-8-6	8	18	40	0
EB 83-2-11	18	38	40	10
MPP 7147-2-1-6	18	18	65	10
SDN 503-12	5	5	53	0
WC-C75	18	30	65	10
ICMV 82113	33	50	40	10
ICMV 82111	18	30	53	5
ICMV 82116	10	30	40	5
ICMV 82117	25	25	53	0
IVC-P 78-2	5	5	53	5
IVC-P 8004-2	5	45	40	10
NELC-H 78-4 (Original)	25	38	65	10
SSC 88 78-4 (Reconstituted)	8	13	45	0
[B 282 x 3/4 ExB-100]-11-9-2-2	15	5	53	0
[F4FC 1438-4-3-2 x J 104 ST]-1-1-5	25	30	53	20
Location mean for test entries	16	21	48	4
Trial susceptible check (7042)	53	30	53	20
Local susceptible check (NHB 3) ^b	50	30	50	16

^a Figures were "Rounded-off" to the nearest whole number.^b Mean of five plots in each replication.

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