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**THE FIRST (1984) PEARL MILLET DISEASE MONITORING NURSERY  
(PMDMN), AICMIP**

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## THE FIRST PEARL MILLET DISEASE MONITORING NURSERY, 1984

(PMDMN)

Epidemics resulting from the gradual build-up of a new pathogen population can severely damage a pearl millet cultivar over a wide area in a year which favors disease development. Several pearl millet cultivars were withdrawn in the past because of their susceptibility to downy mildew. Unfortunately their cultivation was abandoned only after epidemics developed on them, resulting in serious economic loss. The failure to replace cultivars before they experienced significant yield losses due to downy mildew might be due in part to the absence of a reliable method for systematically recording this 'breakdown' in resistance. By monitoring disease levels in cultivars over years and at locations which are representative of the millet growing areas of India, it is possible that information could be obtained on which to base decisions regarding withdrawal of cultivars before farmers experience severe disease losses. With this in view, the pathologists gathered at Junagadh during the AICMIP Workshop in April 1984 agreed to initiate a Pearl Millet Disease Monitoring Nursery (PMDMN) with the following objectives:

1. To monitor downy mildew development on commonly grown cultivars in hot-spot locations
2. To gather information regarding change in the downy mildew pathogen population.
3. To collect data on the prevalence and severity of other diseases, including ergot, smut and rust.
4. To detect the occurrence of new diseases.

The details of entries selected for testing in the 1984 PMDMN are given in Table 1.

All the released cultivars which are widely grown by the farmers should be included in this trial. In order to make judgement regarding the change in the pathogen population and/or the gradual build-up of inoculum, the genetic variability in the seed stocks to be used over years must be eliminated. Thus 10 kg seed of each candidate entry was procured. All the four seed stocks are being kept in reserve in cold storage at ICRISAT Center. Seed from this stock only will be used. Entries will be added to the trial whenever it seems desirable to do so.

#### LOCATIONS

The locations and cooperators in the 1984 PMDMN are listed in the Table 2.

Though the trial was grown and observed at 10 locations, these were not entirely representative of the whole millet growing area of the country. For example, the trial was not tested, for one reason or another, at any locations in Haryana, Tamil Nadu and U.P. Attempts to rectify this situation in the future will be made. For a proper sampling of the prevalent pathogen population and increase or decrease in the disease levels in a particular area over years, it is necessary to grow this trial in all major millet growing areas.

#### DATA RECORD

The prime objective of this trial is to gather information on the variability and changes in the incidence and severity of downy mildew. However, the cooperators were requested to collect data on ergot, smut, rust, and other diseases present. The method of recording were

similar to those as used in IPMDMN, IPMEN, IPMSN and IPMRN trials. Scale for recording blast is also described in these booklets.

## RESULTS

Plant population was adequate (>30) in both replications at all locations, except at New Delhi where one entry, WC-C75, had less than 30 plants in each replication. The DM incidence and severity for all entries are presented in Table 3.

DM was present at all locations except at Dholi. The locations, however, greatly varied in providing disease pressure. ICRI SAT and Ludhiana provided the most severe DM pressure and Aurangabad and New Delhi the least of the locations where DM occurred. Likewise the reactions of cultivars varied. BJ 104, for example, developed much more severe DM than other cultivars at all locations, and it was followed in severity by BK 560. Although the data clearly show the susceptibility of BJ 104, they also show that BK 560 can no longer be considered resistant. The resistance levels of WC-C75 (except Mysore) and MBH 110 were good.

### Other diseases:

Records on the natural occurrence of ergot, smut, rust and blast were taken at all the locations. The detailed data (mean of two replications) are presented in Table 4.

Ergot, smut, rust and blast were reported on all the cultivars. However, locations greatly differed with respect to prevalence and/or severity of one or more diseases. Ergot was most severe at Pune on

the majority of the cultivars followed by Mysore. Smut, on the other hand, was more common at New Delhi followed by Ludhiana. Blast was reported only for Ludhiana, Durgapura, Sumarpur and Dholi. Of some concern was the presence of severe rust on all entries and at the majority of the locations, indicating the high degree of rust susceptibility in all cultivars.

## DISCUSSION

BJ 104 was recommended for withdrawal from cultivation in all states except Rajasthan in 1984. Unfortunately, it caused considerable yield loss in 1983, and in 1984 it was grown in many states where significant damage occurred, especially in Haryana. Such epidemics not only cause serious economic losses, adding to the miseries of the farmers, but also they have long lasting effect in possibly jeopardising the survival of other resistant cultivars by adding enormous amount of inoculum to the ground. This has happened in India several times; first when several repeated epidemics of DM occurred on HB 3 in the early to mid 1970s, and more recently when epidemics occurred on BJ 104. The first was a helpless situation because that time there were no resistant materials available to replace HB 3. In the second case, however, we could not replace BJ 104 in time eventhough we had the capability to do so. Thus the first opportunity to stop DM epidemic is lost. The immediate removal of BK 560 is another opportunity to stop further epidemics. The data presented (Table 3) clearly show the susceptibility of BK 560 from Karnataka to Punjab. In Tamil Nadu, 100% DM has been seen in BK 560 in 1983 in Cuddalore District and also in 1984 (Singh, Unpublished).

So it would seem that serious consideration should be given to the withdrawal of BK 560.

MBH 110 is highly resistant at all the locations tested. However the occurrence of DM on this cultivar increased in incidence in 1984 over 1983. Although DM levels are still very low, this is an indication that the useful life of MBH 110 may be limited.

The reaction of WC-C75 at all (except Mysore) locations is as was expected. At Mysore, it has developed 9% DM severity. However, in the 1984 IPMDMN at Mysore, WC-C75 showed only 4% DM severity.

Another important point is the rust reactions of these cultivars. It appears that all of our cultivated materials are highly susceptible to rust, and if proper attention is not paid to manage this potentially important disease, in some years it may be a major yield reducer.

This was the first year of the PMDMN and response from the cooperators was highly encouraging. However, for the proper and effective future operation and utilization of this nursery, the following points need to be carefully considered.

1. Cultivars should be added to the nursery as they become widely cultivated.
2. The nursery should be grown in more locations, especially in Haryana, Rajasthan, and Tamil Nadu.
3. Should the nursery be grown at reserach stations or in farmers' fields, and who should organize the nursery? (ICRISAT organized it in 1984, is keeping the seed supply in cold storage, and would be happy to organize it in the future if all agree).
4. Is data acquired from the nursery to be used to determine what cultivars should be withdrawn from cultivation? If so, on what basis will such decisions be made?

Table 1. Details of entries included in the 1984 IPMDMN

Entry	Parentage/Origin	Bred at	Released (year)	Status
BJ 104	5141A x J104	N.Delhi	1977	Recommended for withdrawal (1984)
BK 560	5141A x K 560	N.Delhi	1977	Continuing
WC-C75	World Composite	ICRISAT	1982	"
MBH 110	-	MAHYCO	1982	"

Table 2. Locations and cooperators for the 1984 PMDMN

Location	Cooperators	State
Aurangabad	N.B. Pawar	Maharashtra
Dholi	B. Mishra	Bihar
Durgapura	Govind Singh	Rajasthan
ICRISAT	S.D. Singh/S.B. King	A.P.
Jamnagar	S.D. Nafade	Gujarat
Ludhiana	S.S. Chahal	Punjab
Mysore	H.S. Shetty	Karnataka
New Delhi	S.B. Mathur	Delhi
Pune	S.G. Bangar/M.S. Rane	Maharashtra
Sumerpur	Govind Singh	Rajasthan

Table 3. Downy mildew incidence (%) and severity (%) of the four entries in the PMDMN grown at 10 locations during the 1984 rainy season

Locations	BJ 104		BK 560		MBH 110		WC-C75	
	Inc.	Sev.	Inc.	Sev.	Inc.	Sev.	Inc.	Sev.
Aurangabad	2	1	0	0	0	0	0	0
Dholi	0	0	0	0	0	0	0	0
Durgapura	55	30	19	6	0	0	0	0
ICRISAT	89	76	34	15	1	1	2	2
Jamnagar	40	27	5	3	0	0	2	1
Ludhiana	91	83	23	16	1	1	0	0
Mysore	26	18	14	10	3	2	14	9
New Delhi	25	13	0	0	0	0	0	0
Pune	66	54	11	9	0	0	5	4
Sumerpur	35	21	5	2	1	1	0	0
Mean	43	32	11	6	<1	<1	2	2



Table 4. Incidence (%) of ergot, smut, rust and blast at 10 locations on four pearl millet cultivars during 1984 rainy season

Locations	BJ-104				BK-560				MBH-110				WC-C75			
	E	S	R	B	E	S	R	B	E	S	R	B	E	S	R	B
Ludhiana	15	8	18	13	10	11	18	10	11	11	13	10	13	10	13	8
New Delhi	8	18	18	0	4	13	18	0	1	5	8	0	1	13	5	0
Durgapura	5	2	2	2	0	2	2	2	0	0	0	2	0	2	2	2
Sumerpur	15	2	2	2	10	3	2	2	0	0	0	2	1	1	2	2
Jamagar	6	5	38	0	5	8	53	0	2	1	63	0	5	1	48	0
Pune	63	0	68	0	57	0	60	0	69	0	70	0	43	0	58	0
Aurangabad	0	0	50	0	0	0	40	0	0	0	50	0	0	0	30	0
ICRISAT	0	5	53	0	0	8	53	0	0	0	40	0	0	0	40	0
Mysore	35	0	40	0	50	0	40	0	50	0	40	0	43	0	50	0
Dholi	13	0	23	8	13	0	25	18	1	0	8	6	10	0	18	28

E = Ergot; S = Smut; R = Rust; B = Blast.