REPUBLIC OF SENEGAL,

MINISTRY OF RURAL DEVELOPMENT

SENEGALESE INSTITUTE OF AGRICULTURAL RESEARCH

DEPARTMENT OF RESEARCH ON CROP PRODUCTION

ANNUAL REPORT

ON GROUNDNUT PATHOLOGY - 1987

BY

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MARCH 1988

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During 1987 screening the germplasm entries against leaf spots and chemical control were the main items of research. These studies were carried out at Nioro which is a hot spot for leaf spots of groundnut. During the year under report the leaf spots pressure at Nioro was quite high. The results of these studies are discussed in the following pages.

1 - RESISTANCE SCREENING AGAINST LEAF SPOTS

1 .1 - Screening germplasm entries

During 1986 season, 838 germplasm entries were screened at Bambey against cercospora leaf spot under natural infection. 252 entries which exhibited low leaf spot infection during 1986 season were rescreened during 1987. The tria1 was conducted at Nioro where the natural infection of leaf spots is very high due to humid conditions. Two rows of each entry were sown on 07-07-1987. Row length was 3 m with 60 x 15 cm2 spacing. The seeds were treated with granox before sowing. One seed was sown at each pocket.

Observations were recorded thrice (28-08, 29-09 and 16-10-87) on the natural infection of leaf spots. A scale of 0-10 proposed by ICRISAT where 0 stands for no infection and 10 denotes 100% leaf area affected by leaf spots was used for recording the observations. The first symptoms were noticed in the second week of August on some of the entries. The disease pressure was developed considerably by the timeofmaturity. Final observations were recorded on 16.10.1987. Disease score for each entry is given in table 1.

Table 1 : Leaf spot observations on germplasm entries

N°	ENTRY	AVERAGE DISEASE SCORE
1	57-58	8.5
2	48-115	7.5
3	58-579	6.5
4	58-587	7
5	58-611	6. 5
6	58-654	7.5
7	58-665	7. 5
a	72-26	a. 5
9	28-24	a
10	28-236	6. 5
11	29-56	5. 5
12	42-44	4. 5
13	53-66	4
14	53-86	4
15	53-300	5
16	55-131	4. 5
17	57-67	4. 5
la	57-94	6
19	57-279	5. 5
20	57-280	6
21	57-233	8
22	58-119	5. 5
23	58-121	6
24	59-154	5
25	59-155	5
26	59-238	4. 5
27	59-266	5
28	64-103	5.5
29	75-106	6
30	28-209 B	5. 5
31	28-219	5. 5
32	28-224	4. 5
33	28-229	6

Table 1 : Contd.

N°	ENTRY	AVERAGE DISEASE SCORE
34	48-38 A	4.5
35	48-55	5
36	48-101	4.5
37	48-111	4
38	48-143	6
39	50-36	5
40	52-2	5
41	52-34	6.5
42	53-42	7.5
43	53-68	5
44	53-136	6.5
45	55-203	6
46	55-23.4	5
47	55-238	5.5
48	55-479	4
49	55 H46 El7	5
50	56-70	5.5
51	56-181	6
52	56-222	4.5
53	56-233	4.5
54	56-282	6.5
55	56-286	5
56	56-295	4. 5
57	56-311	3.5
58	56-326	5
59	56-370	4.5
60	56-375	4. 5
61	56-379	4. 5
62	56-383	5
63	56-401	6
64	56-405	8
65	56-423	4. 5
66	56-447	5
67	56-288	6

Table 1 : Contd.

N°	ENTRY	AVERAGE DISEASE SCORE
68	57-317	5.5
69	58-19	4.5
70	58-21	5.5
71	58-26	6
72	58-41	5.5
73	58-45	5
74	58-52	4.5
75	58-53	5
76	58-7 1	6
77	58-138	5
78	58-139	4
79	58-160	5
a0	58-167	5
81	58-219	6
a2	58-233	5.5
a3	58-551	a
a4	58-254	7
a5	58-332	a
86	58-348	6
a7	58-351	4.5
88	58-360	7
a9	58-368	6
90	58-577	6
91	58-396	6
92	58-399	5
93	58-402	5.5
94	58-404	6
95	58-408	5
96	58-445	6
97	58-619	7
98	59-48	6.5
99	59-68	5
100	59-105	4.5
101	59-110	6

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Table 1 : Contd.

N°	ENTRY	AVERAGE DISEASE SCORE
102	59-118	5
103	59-121	6
104	59-123	4.5
105	59-125	5
106	59-148	5
107	59-151	5
108	59-157	5.5
109	59-191	6.5
110	59-196	5.5
111	59-231	4
112	59-243	4.5
113	59-355	5.5
114	59-502	5
115	61-81	8.5
116	58-618	7
117	61-99	5
118	73-28	6.5
119	75-67	6.5
120	75-68	7.5
121	75-70	5.5
122	75-72	5
123	75-84	5
124	75-88	8
125	75-99	7
126	75-104	4.5
127	75-114	5.5
128	75-118	5.5
129	75-135	9
130	79-1	9
131	79-9	8.5
132	79-23	7.5
133	79-37	6
134	79-42	6

Table 1 : Contd.

N°	ENTRY	AVERAGE DISEASE SCORE
135	58-646	7.5
136	79-90	7
137	Altika	6,5
138	Bir 16	8
139	EH 235	7.5
140	EH 247-2-2	6.5
141	EH 282 Bis 2	7
142	EH 332 Bis 3	7
143	EH 333-5	6.5
144	EH 336-4	7
145	GH 119-20	6
146	Israel 4	6.5
147	NC 5 erigée	6
148	NC 17	5.5
149	PR 23 B	6.5
150	PR 26 B	6
151	PR 64 B	5
152	R 295 B	7
153	R 299 B1	6.5
154	R 299 B2	5.5
155	R 2919 A	6.5
156	Seneqal Oriental	5
157	UF 72-313	6
158	UF 72-405	5.5
159	UF 72-417	6
160	58-656	7.5
161	V 773	5
162	v 781	5
163	CH 79-73	6
164	E 58-331	7
165	E 55-265	6.5
166	79-10	6.5
167	58-668	6.5
168	72-24	6

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Table 1 : Contd.

N°	ENTRY	AVERAGE DISEASE SCORE
169	24-5	6.5
170	28-234	6
171	30-86	6
172	42-94	6
173	52-10	5.5
174	52-19	5.5
175	53-60	5.5
176	53-100	6
177	53-298	5
178	55-511	5
179	57-14	6.5
180	57-102	5
181	57-319	5
182	57-333	5.5
183	58-83	6
184	58-84	6.5
185	58-97	6.5
186	58-147	5
187	58-157	5
188	58-165	5.5
189	58-173	4.5
190	58-453,	4.5
191	58-650	4.5
192	59-133	5.5
193	59-135	5.5
194	59-147	5
195	59-163	55
196	59-258	4.5
197	59-260	5
198	59-267	5
199	59-503	5.5
200	61-92	4.5
201	28-210 A	5

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Table 1 : Contd.

N°	ENTRY	AVERAGE DISEASE SCORE
202	48-21	4
203	48-38	4
204	48-44	4
205	48-62	5
206	48-87	5.5
207	48-151	4.5
208	48-154	4
209	48-108	4.5
210	50-16	6.5
211	50-33	6.5
212	51-40	5.5
213	52-8	6
214	52-13	6
215	52-32	6.5
216	52-35	7
217	53-40	6. 5
218	53-331	7
219	55-91	7. 5
220	55-93	7
221	56-69	6. 5
222	56-89	7
223	56-176	4. 5
224	56-188	5
225	56-221	6
226	56-2 36	6
227	56-242	4.5
228	56-277	5.5
229	56-293	4.5
230	57-23	5.5
231	57-327	5.5
232	57-376	7
233	58-17	5.5
234	58-18	5
235	58-31	5

.../...

Table 1 : Contd.

N°	ENTRY	AVERAGE DISEAGE SCORE
236	58-54	5
237	58-68	4.5
2'38	58-156	6
239	58-238	5.5
240	58-682	5
241	59-92	5
242	59-115	5.5
243	59-130	5
244	59-143	4
245	59-145	4.5
246	59-390	4.5
247	63-104	5
248	68-122	4.5
249	75-90	8.5
250	79-87	6.5
251	73-30	7. 5
252	73-33	6

Note : Entries with grades 1, 2 and 3 were considered as resistant , 4 and 5 moderately resistant, 6 and 7 moderately susceptible, 8 and 9 susceptible and 10 highly susceptible.

The results in table 1 revealed that no variety is free or resistant to leaf spots. However, 100 varieties exhibited moderate resistance. 127 varieties were observed to be moderately susceptible while 25 were susceptible. The distribution of germplasm entries amongst rarious intensity grades was as under.

Grade	Number of entry	Grade	Number of entry
3.5	1	4	11
4.5	35	5	53
5.5	39	6	40
6.5	31	7	17
7.5	11	a	7
8.5	5	9	2

Moderately resistant entries with intensity grades from 3,5 to 5 are listed in table 2. These entries will be rescreened during 1988 rainy season.

Table 2 : List of moderately resistant entries

Grade 3.5 : - 56-311

Grade 4 : - 53-66, 53-86, 48-111, 55-233, 58-139
59-231, 48-21, 48-38, 48-44 , 48-154 & 59-143.

Grade 4.5 : - 42-44, 55-131, 57-67 , 59-238 ,
28-224, 48-38 A, 48-101, 56-222, 56-233,
56-295, 56-370, 56-375, 56-379, 56-423, 58-19,
58-52, 58-351, 59-105, 59-123, 59-243, 75-104,
58-173, 58-453, 58-650, 59-258, 61-92,
48-151, 48-108, 56-176, 56-242, 56-293,
58-68, 59-145, 59-390 & 68-112.

Grade 5 : - 53-300, 59-155, 59-238, 59-266,
48-55, 50-36, 52-2, 53-68, 55-214,
55 H 46 E 17 , 56-286 , 56-326, 56-383,
56-447, 58-45, 58-53, 58-138, 58-160,
58-167, 58-399, 58-408, 59-68, 59-118,
59-125, 59-148, 59-151, 59-502, 61-99,
75-72, 75-84, PR 64 B, Senegal Oriental,
V 773, V 787, 59-298, 55-511, 57-102,
57-319, 58-147, 58-157, 59-147, 59-260,
59-267, 28-210 A, 48-62, 56-188, 58-18,
58-31, 58-54, 58-68, 59-92, 59-130 and
63-104.

II - CHEMICAL CONTROL OF LEAF SPOTS :

Groundnut leaf spots are quite serious in Senegal causing about 30-40% loss in yield. Hence an experiment was initiated in 1986 Crop Season to find out the efficacy of some common fungicides for the effective control of these diseases. During 1986, the experiment was conducted at Bambey and on one variety (73-33). During 1987, the experiment was conducted at Nioro which is a hot spot for leaf spots and on 2 varieties viz. 73-33 and 73-30. The experimental details were as under :

Design : Split plot design
Location : Nioro du Rip
Varieties: 2 viz., 1) '73-33
2) 73-30
Treatments: 6 viz, 1) Benomyl (Benlate) 200 g a.i./ha
2) Benomyl (Benlate) 100 g a.i./ha
3) Mancozeb (Mancozan blue) 1500 g a.i./ha
4) Copper t Zineb (Calimix) 400 g p.c./100 l
5) Maneb 160 g a.i./100 l
6) Absolute Control

Replications : Four
Plot Size : 3.5 x 4.5 m^2 (7 lignes of 4.5 m length)
Spacing : 50 x 15 cm^2
Fertilizers : 6-20-10 @ 150 kg/ha as basal dose
Date of sowing: July 8, '1987.

The fungicidal treatments were started after the appearance of the leaf spots. The leaf spots had started appearing in the second week of August. Altogether 3 fungicidal sprays were given. The first. spray was given on 22.08.87, the second on 07.09.87 and the third on 29.09.87. Observations on leaf spots incidence were recorded at the time of each fungicidal spray i.e on 22.08, 07.09 and 29.09. The final observations were recorded on 16.10.87. The trial was harvested on 28.10.1987 and the yield recorded. The summary of results for disease score is presented in table 2 while that of yield data is given in table 3. The results for both disease score and yield are depicted simultaneously in a graph on page 15.

The disease pressure was quite high at the time of final observation. The average leaf spots score in the scale of O-10 was 7 in untreated plots.

Table 2 : Summary of results for disease score

Variety / Fungicides		73-33	73-30	Mean	S.E.	C.D.
Benomyl	200 g a.i./ha	5.75	6.00	5.875	0.058	0.167 (5%)
Benomyl	100 g a.i./ha	6.00	5.75	5.875		0.222 (1%)
Mancozeb	400 g a.i./ha	5.75	5.75	5.750		
Calimix	400 g p.c./100 l	6.00	6.00	6.000		
Maneb	160 g a.i./100 l	6.25	6.00	6.125		
Control		7.00	7.00	7.000		
Mean		6.125	6.083			

SE, 0.006

CD. N.S.

S.E. for body of the table = 0.116

C.D. for body of the table = N.S.

Coefficient of variation : 7.60 %

Note :

N.S. = Non Significant

Table 3 : Summary of results for yield (Figures in kg/ha)

Variety / Fungicides		73-33	73-30	Mean	S.E.	C.D.
Benomyl	200 g a.i./ha	4010	3514	3762	39	114 (5%) 151 (1%)
Benomyl	100 g a.i./ha	3595	2548	3071		
Mancozeb	g 1500 a.i/ha	3110	2452	2781		
Calimix	400g p.c./100 l	3143	2405	2774		
Maneb	160g a.i./100 l	3103	2738	2920		
Control		2957	2367	2662		
Mear		3319	2670			
S.E.	4					
C.D.	20 (5%)					
	36: (1%)					

S.E. for body of the table - 79

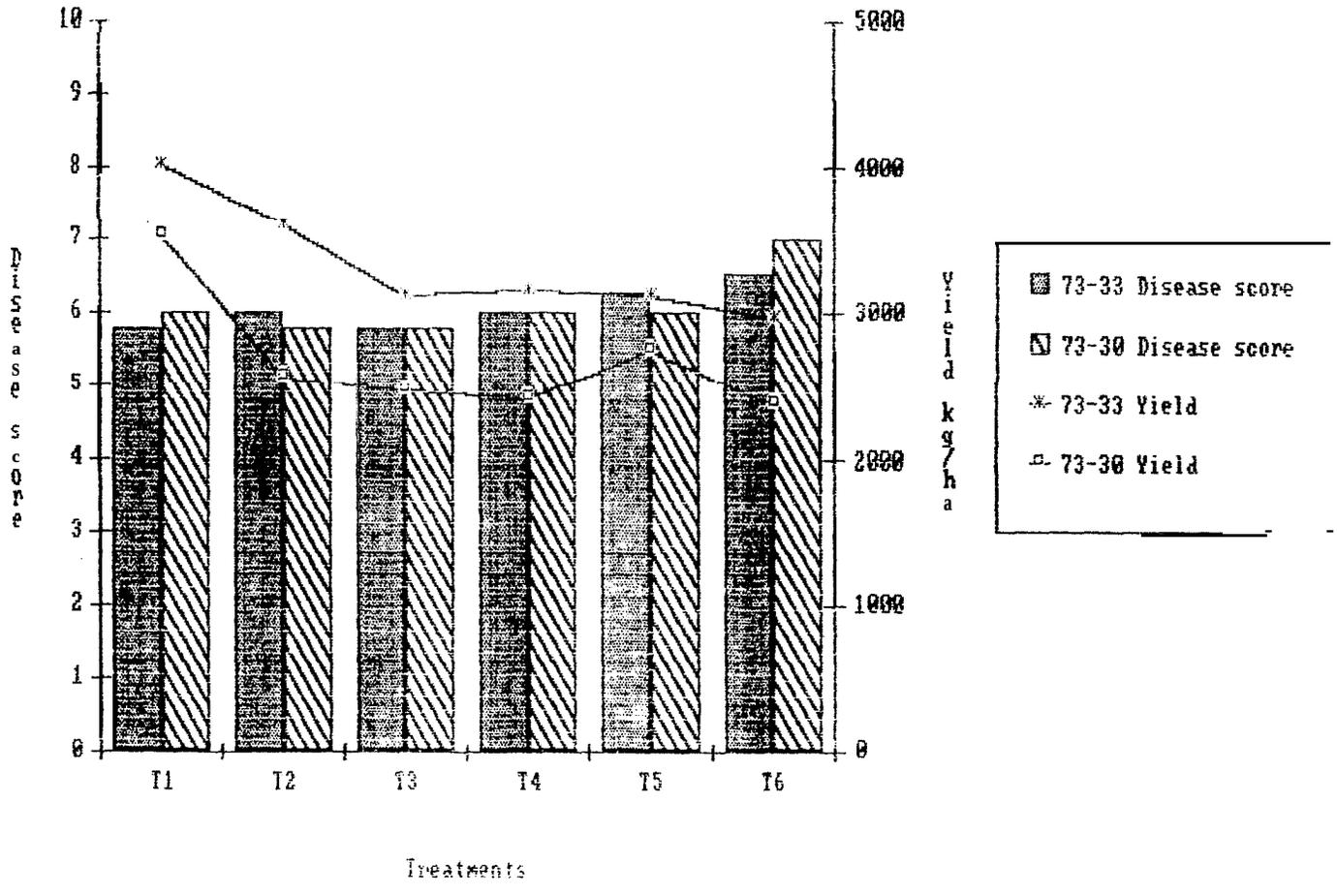
C.D. for body of the table - N.S.

Coefficient of variation : 10.56%

Note :

N.S. - Non Significant

Chemical control of leafspots.



1 : Benomyl (Benlate) 200 g ai/ha
2 : Benomyl (Benlate) 100 g ai/ha
3 : Mancozebc (Mancozan Blue) 1500 g ai/ha
4 : Copper t Zineb (Calimix) 400 g pc/100 l
5 : Maneb 160 g ai/100 l
6 : Absolute Control

From the results in table 2 it is seen that the differences in mean disease score of various treatments were highly significant. All the fungicides were highly effective in reducing the leaf spots score.

Mancozeb exhibited the lowest score followed by Benomyl (both 200 and 100 g doses), Calimix and lastly Maneb. The results of 1986 had the similar trend. In 1986 Benomyl 200 g a.i./ha had the least disease score followed by Mancozeb and Calimix.

The disease score of two varieties did not dif'fer significantly indicating that both the varieties are equally susceptible to leaf spots. The interaction amongst the varieties and fungicides was also observed to be non significant. This means the effect of fungicides was the same on both the varieties.

The results in table 3 indicated that the yield differences amongst various treatments were highly signif icant . Benomyl 200 g a.i/ha had given the highest yield (3762 kg/ha) which was significantly superior over all other treatments. The next highest yield (3071 kg/ha) was obtained in Benomyl 100 g a.i./ ha treatment which was also significantly superior to all other treatments' Maneb (2920 kg/ha) and Mancozeb (2781 kg/ha) gave signi ficanthy more yield than the absolute control, (2662 kg/ha). But the increase in yield due to Calimix was statistically non-significant. However it was approaching the level of significance.

The differences amongst the overall yield of two varieties were highly significant. This is due to difference in the yield potential of these two varieties, and not because of leaf spots infection. 7 3- 3 3 is comparat ively long durat ion variety (about 110 days) than 73-30 (about 90 days) and has a high yield potentiai.

The interaction in between varieties and the fungicides was observed to be absent. The fungicides had similar effect on both the varieties.

In case of disease score data, the trend of results is similar during both the years viz., 1986 and 1987. However, there is variation in the yield data obtained during 1986 and 1987. The yield differences amongst various treatments were statistically non-significant during 1986. While they were highly significant during 1987. In 1986, Mancozeb treatment had given the highest yield which was, howerer, statistically on par with the absolute control while during 1987 Benomyl 200 g a.i. /ha gave the highest yield which was highly significant not only over the absolute control but also over all other treatments.

In case of disease score similar trend was noticed during both the years while in case of yield, the trend during 1987 was altogether different from 1986. It is, therefore, proposed to repeat this experiment during 1988 rainy season.

III - DETECTION OF SEED MICROFLORA :

Some studies on seed microflora were carried out in the past at Texas University on the kernels and shells collected from Senegal. These studies revealed the presence of 17 pathogens. In tne present studies attempts were made to find out the percentage of root rots and seedling infection and detect the pathogens associated with this seed rot and seedding infection.

Seeds of 2 varieties viz., 73-33 and 73-30 were used for these studies. Seed microflora was detected by rolled towel method. Seeds were put on sets of three blotter sheets previously moistened with water. The sheets were rolled and kept at room temperature. The sheets were opened after 10 days and the observations were recorded for seed rot and seedling infection. The microflora associated with seed rot and seedling infection was examined under the microscope. The results are presented in table 4.

IV - SURVEY OF GROUNDNUT DISEASES :

Groundnut leaf spots particularly early leaf spot was wide spread during 1987 crop season. Late leaf spot was restricted to few locations. It was quite high at Nioro. Seedling mortality due to Aspergillus niger and Macrophomina Phaseoli was less as compared to 1986 season. However, the infection of Macrophomina sp. on the adult plants was wide spread. It was sporadic in nature but very severe in the pockets affected. It was seen almost throughout the main groundnut area. Peanut clump as usual was very common in the fields around Bambey.

table 4 : Seed microflora in 2 varieties of groundnut

Variety	Healthy seed (%)	Inf ected seed (%)	Organisms àetected on the infected seed with their percentage
73-33	90	10	Aspergillus sp. 1
			Rhizopus sp. 5
			Aspergillus t Rhizopus 2
			Rhizopus t Bacteria 2
73-30	89	11	Rhizopus sp. 5
			Bacteria 6

These organisms were also found in the seed pathology studies carried out at Texas Unuversity.