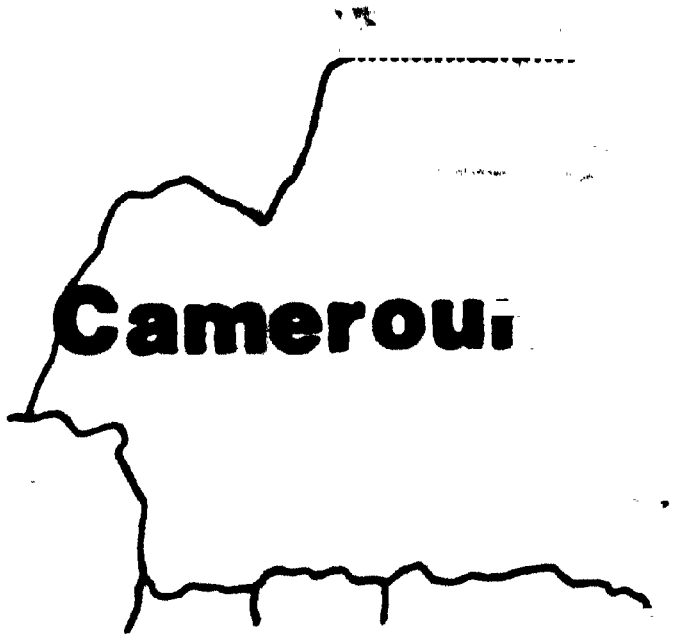
Dr Swindale

TECHNICAL REPORT

Sorghum and Pearl Millet Diseases in the North of Cameroon



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T E C H N I C A L R E P O R T

Sorghum and Pearl Millet Diseases in the North of Cameroon

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by collaboration of

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TABLE OF CONTENTS

		Page
1.	Objectives	1
2.	Methods of Evaluation	1
	2.1 Sorhum Diseases	1
	2.1.1 Rating Scale	2
	2.1.2 Methods of Scoring	2
	2.1.3 Route of Visit for Farmers' Fields	3
	2.2 Pearl Millet Diseases	4
	2.2.1 Rating Scale	6
	2.2.2 Method of Scoring	7
3.	Results	8
	3.1 Sorghum Diseases on Breeders' Material	9
	3.2 Sorghum Diseases in Farmers' Fields	10
	3.3 Pearl Millet Diseases on Breeders' Material and Germplasm	11
	3.4 Pearl Millet Diseases in Farmers' Fields	12
4.	Conclusion	13
	4.1 Sorghum Diseases	13
	4.2 Pearl Millet Diseases	13
	4.3 Striga on Sorghum and Pearl Millet	14
	Acknowledgement	14
	Annex 1	15

1. OBJECTIVES

- To evaluate breeding material and germplasm of sorghum and pearl millet of the National Cereals Research and Extension Program of I.R.A. (Institut de la Recherche Agronomique), Cameroun.
- To visit a few farmers' fields in Northern Cameroun in order to get an indication of diseases on local sorghum and pearl millet.
- To work with a pathologist of the National Program to get him familiar with the different diseases of sorghum and pearl millet.

2. METHODS OF EVALUATION

2.1 Sorghum Diseases

The sorghum diseases observed in improved lines in experimental trials and in farmers' fields, the abbreviations of the diseases, and their causal agents are given in Table 1 below.

Panicle diseases were for the most part absent in experimental trials. It should be noted however, that the grains in many lines in those trials were still in the milk stage. All panicle diseases encountered, both in experimental trials and in farmers' fields were one or other of the smuts and grain mold.

Table 1. Diseases of sorghum and their causal agents in improved lines and in farmers' fields in the north of Cameroon in October 1987.

Diseases	Abbre-viation	Type of organism	Scientific name
Grey leaf spot	GL	Fungus	Cercospora sorghi
Leaf anthracnose	AN	Fungus	Collectotrichum graminicol
Oval leaf spot	OV	Fungus	Ramulispora sorghicola
Sooty stripe	SS	Fungus	Ramulispora sorghi
Zonate leaf spot	ZO	Fungus	Gloeocercospora sorghi
Leaf blight	LB	Fungus	Exserohilum turcicum
Long smut	LS	Fungus	Tolyposporium ehrenbergii
Head smut	HS	Fungus	Sporisorium reilianum
Covered smut	CS	Fungus	Sporisorium sorghi
Grain mold	GM	Fungus	Curvularia lunata, Phoma sorghina, Fusarium spp.
Yellow leaf blotch	YLB	Bacterium	Pseudomonas spp.
Striga		Parasitic flowering plant	Striga hermonthica

2.1.1. Rating Scale

In all cases a scale of 1 to 6 was used for leaf disease severity as follows:

1. No symptoms
2. Up to 5% leaf area infected (LAI)
3. 6 to 25% LAI
4. 26 to 50% LAI
5. 51 to 75% LAI
6. More than 75% LAI

For grain molds and smuts the following scale was used:

1. No symptoms
2. Up to 10% grains molded (GM) or with smut (S)
3. 11 to 25% GM or S
4. 26 to 50% GM or S
5. More than 50% GM or S

2.1.2. Methods of Scoring

In experimental trials plot scores were given, taking into account the top 4 leaves. Border rows were excluded in trials with more than 2 rows per plot. The stage of panicle development was noted for each plot. All replications were scored in a given trial.

In farmers' fields, 100 plants were arbitrarily chosen and the presence or absence of a disease in the top 4 leaves was noted. When a disease was present on a given plant, a single score was given to that plant taking into account the top 4 leaves and using the scale described above. In order to avoid counting a plant twice, several plants were assessed while walking towards a given direction. A U-turn was made and plants were assessed in the opposite direction. Fifty plants were observed in each direction. When there was not enough plants within the horse-shoe path a second U-turn was made to complete the sample size of 100 plants.

The incidence of Striga was assessed in 2 farmers' fields. One hundred plants were arbitrarily chosen. If one or more Striga plants were noticed within a 10 cm radius from any one of the 100 sorghum plants, that sorghum plant was regarded as being infected by Striga. The incidence of Striga was then expressed as per cent of sorghum plants infected.

2.1.3. Route of visit for farmers' fields

A total of 6 farmers' fields were visited. Two farms were west of Maroua at Ziver near Mokolo and at Guitale, 86 and 126 km from Maroua respectively. A third farm was about 2 km north of Maroua on the road from Mora. The remaining three farms were east of Maroua at Lara, Yagoua and Moulvouday, 50, 114, and 75 km from Maroua, respectively. These 6 farms were visited in 2 separate days. The first 3 farms were assessed on the first day and the remaining 3 on the second day. On each occasion, Maroua was the starting point, and the end point, and the route taken was roughly circular. The 6 farms were arbitrarily chosen (Fig. 1).

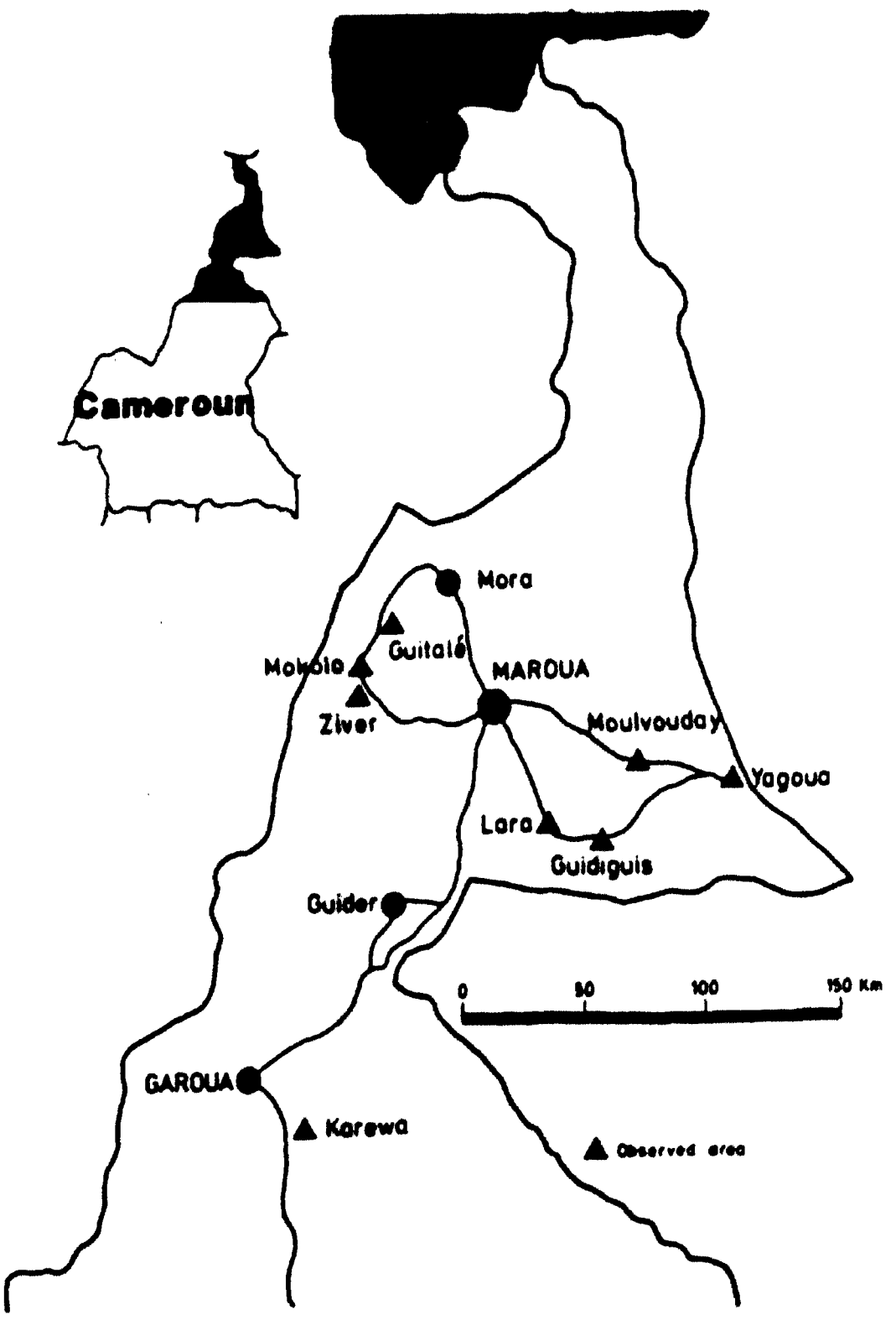

Fig.1. Route of visit and area observed in North of Cameroon.

2.2. Pearl Millet Diseases

- **Downy Mildew (Sclerospora graminicola)**

Biology:

The primary infections of DM are coming from the soil in the form of oospores which originate from plant debris of the previous season. The oospores infect only young millet seedlings through the roots and the fungus grows inside the plant (=systemic infection). If the temperature is low (ca. 25 to 28o C) and the relative humidity is high (90 -100 %) profuse downy white growth occurs predominantly on the lower surfaces of infected leaves. These spores can induce secondary infections which are less important than the primary infections of oospores. As necrosis begins, oosopore production occurs and dry necrotic tissues from mature infected plants contain masses of oospores.

Symptoms:

Leaves of infected plants appear chlorotic or yellowish and under humid conditions you observe profuse white growth on leaves. The inflorescenses can be completely or partially malformed with florets converted into leavy structures of diverse appearance. Tillers infected early in their development produce no normal headlike structure. The later the infection, the more normal the head.

Distribution:

Downy mildew is in general more prevalent in higher rainfall areas (>600 mm).

- **Smut (Tolyposporium penicillariae)**

Biology:

Millet heads are infected by smut spores by entering the stigma of a floret and the grain formation is replaced by the formation of smut spores in sori. The fungal spores originate from the soil from the previous season. At maturity the sori release smut spores (=teliospores) which will rest on and in the soil till next year to infect again millet heads.

Symptoms:

Variable numbers of grains of a head are replaced by smut sori which appear green at the beginning of production and have the same size or are slightly bigger than the millet grains. Towards maturity the smut sori turn dark brown and break off to release the black smut spores.

Distribution:

Smut is found in all millet growing areas from low to high rainfall. However the disease rarely reaches serious yield losses on local varieties. It is quite common to find higher smut severity on heads with poor exersion. The bottom area of the head covered by the flag leave offers an ideal microenvironment for the development of the fungus.

- Ergot (*Claviceps fusiformis*)

Biology:

The primary source of infection comes from the sclerotia burried in the soil. The infection occurs through stigmata at the flowering stage. Some days later a thick liquid starts to form on the ears. This honeydew includes fungal spores which can be distributed to other millet heads by mechanical transmission of insects. Towards maturity sclerotia are formed which are dark brown to dark violet. The sclerotia contain different alkaloids which are very toxic.

Symptoms:

The first appearance of ergot is the production of a creamy, pink or red coloured sticky liquid called honeydew. The honeydew can drip down the inflorescenses onto the upper leaves. Subsequently long dark-coloured hard structures, sclerotia, develop from infected florets. Sclerotia can be as large as 6 mm by 2 mm.

Distribution:

Ergot is found more in higher rainfall areas (>600 mm). It is rare to find ergot on local millet in the Sahelian Zone. Introduced exotic material is much more infected by ergot than local material. In general more ergot is found on secondary tillers and on later planted germplasm.

- Leaf Diseases

Leaf Blast (*Pyricularia grisea*)

Lesions on leaf blades are roughly diamand-shaped to circular, up to 1 cm long, with dark brown margins and lighter-colored centers. Lesions have chlorotic-yellow haloes with an extension of the brown margins into the haloes at opposite ends of the lesions.

Circular Leaf Spot (*Dactuliophora elongata*)

Nearly circular lesions, with alternating concentric bands of straw and brown colouration, appear on the leaf blades. The diseases is found only in higher rainfall areas.

Rectangular Leaf Spot (Ramulispora sp.)

Lesions are forming rectangular lesions with yellow brown to tan colour. Within the lesions small fine concentric lines can be observed. Rectangular leaf spot appears in nearly all millet growing areas.

2.2.1. Rating Scale

Incidence

Each hill or plot showing any symptom for a particular disease was counted as an infected hill or plot.
The percentage was calculated by dividing the number of infected hills or plot by the number of total hills or plot observed multiplied by hundred.

Severity

- **Downy Mildew**

  1 - No symptoms
  2 - Symptoms on nodal tillers only
  2 - Symptoms on main tillers but still more than 50% heads normal
  4 - Symptoms on many main tillers so that there are less than 50% heads normal
  5 - Symptoms on main stems and tillers so that there are no productive heads

- **Smut**

  Rating scale of 0 - 100 % (Fig. 2)

- **Ergot**

  Rating scale 0 - 100% (Fig. 3)

- **Leaf Diseases**

  Assess the top four leaves only

  1 - No symptoms
  2 - Few scattered lesions
  2 - Lesions on up to 10 percent of leaf surface
  4 - Lesions covering 11-25 percent of leaf surface
  5 - Lesions covering more than 25 percent of leaf surface

2.2.2. Method of Scoring

All the breeders' material and germplasm was evaluated on a plot basis and not on a single hill or plant basis.

Farmers' fields were chosen randomly. In each of the observed fields 100 hills have been counted at random with a tally counter and notes were taken for diseases in a notebook. The fields were crossed diagonally and in each diagonal 50 hills were evaluated for diseases and Striga.

The incidence of Striga was assessed according to the same method as for sorghum. To visit farmers' fields, the same route was followed as described earlier in this report. (Fig.1).

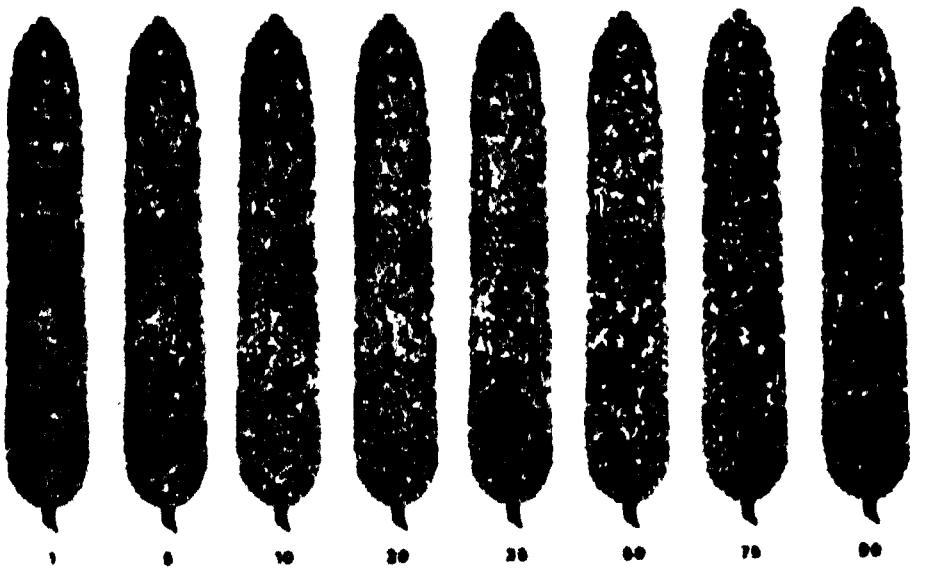

Fig.2. Pearl millet smut severity assessment key.

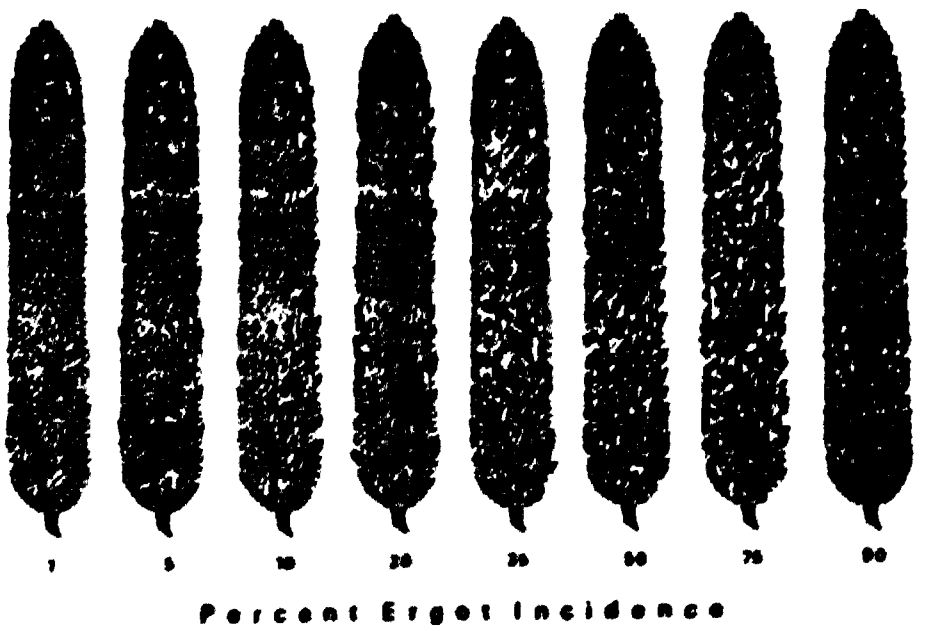

Fig.3. Pearl millet ergot severity assessment key.

3. RESULTS

3.1. Sorghum Diseases on Breeders' Material

The following trials were scored at the Guiring Research Station:

1. Sorghum Hybrid Observation Nursery with 75 entries and 2 replications.
2. Preliminary Sorghum Variety Yield Trial with 17 entries and 2 replications.
3. West Africa sorghum Variety Adaptation Trial with 20 entries and 2 replications.
4. West Africa Sorghum Hybrid Adaptation Trial with 25 entries and 2 replications.
5. Parent lines with 42 entries and no replications.

At the Karewa Research Station, the following trials were scored:

1. Pioneer Hybrid with 40 entries and 2 replications.
2. Introduction Sorghum Nursery with 75 lines and 2 replications.
3. Cameroon Sorghum Hybrid Observations Nursery.

The incidence and severity of the various diseases were quite low in all of the trials, except Pioneer Hybrids. Thus only the results from the sorghum Hybrid Observation Nursery together with those from the Pioneer Hybrids will be reported in some detail. In all the trials, grey leaf spot and leaf anthracnose were predominant. Majority of the entries in all of the trials, except Pioneer Hybrids, were free of leaf diseases in the top 4 leaves and of panicle diseases.

Details on the Sorghum Hybrid Observation Nursery are given in Tables 2 and 2. A summary of the data for Pioneer Hybrid is given in Table 4.

Table 2. Number and percentage of entries with leaf diseases in the sorghum Hybrid Observation Nursery, Guiring Station, Extreme North Province of Cameroon, October 1987.

Replications(2)	GL		AN		SS		OV	
	NO	%	NO	%	NO	%	NO	%(1)
1	12	17.2	5	6.6	1	1.2	1	1.2
2	12	17.2	8	10.6				

1. NO = Number of entries, and % = percent entries with th disease indicated, out of a total of 75 entries. GL=Grey Leaf Spot, AN=Leaf Anthracnose, SS=Sooty Stripe, OV=Oval Leaf Spot. 2.
For the first replication, 17 entries were diseased with 2 entries having both GL and AN. Comparable figures for the second replication were 12 and 8.

Table 3: Disease severity from representative lines in the Sorghum Hybrid Observation Nursery Guiring Station, Extreme North Province of Cameroon, October 1987.

Entry	Disease severity (1)			
	GL	AN	SS	OV
DSH 5	2.0	1.0	1.0	1.0
DSH 6	1.0	1.5	1.0	1.0
DSH 10	2.0	1.5	1.0	1.0
DSH 11	1.5	1.0	1.0	1.0
DSH 14	1.5	1.0	1.0	1.0
DSH 20	1.0	1.0	1.0	1.0
DSH 25	1.5	1.0	1.0	1.0
DSH 26	1.5	1.0	1.0	1.0
DSH 29	1.5	1.0	1.0	1.0
DSH 24	1.5	1.0	1.5	1.0
DSH 46	1.5	1.5	1.0	1.0
DSH 52	1.5	1.0	1.0	1.5
DSH 57	1.5	1.0	1.0	1.0
DSH 62	1.5	1.5	1.0	1.0
DSH 66	1.5	1.0	1.0	1.0
DSH 69	2.0	2.0	1.0	1.0
DSH 70	1.0	1.5	1.0	1.0

1. Mean from 2 replications. Based on a scale of 1 to 6. All entries were in the milk stage. GL = Grey leaf Spot, AN = Leaf anthracnose, SS = Sooly Stripe, OV = Oval Leaf Spot.

Table 4. A summary of the incidence and severity of grey leaf spot, leaf anthracnose and grain mold in a Pioneer Hybrid Trial from a single replication with 40 entries, at Karewa Research Station, Extreme North Province of Cameroon, October 1987.

Disease score(1)	Grey leaf spot		Leaf anthracnose		Grain mold	
	No. of entries	%	No. of entries	%	No. of entries	%
1	0	-	0	-	0	-
2	7	17.5	12	22.5	0	-
2	22	57.5	9	22.5	6	15
4	9	22.5	0	-	0	-
5	1	2.5	0	-	0	-
6	0	-	0	-	-	-
TOTAL	40	100	22	55	6	15

1. See page 2 for explanation of disease scale.

With respect to the other replicated trials at the Guiring Station not more than 5 entries in any one replication was infected on the top 4 leaves. Infection was due to either the grey leaf spot fungus or the leaf anthracnose fungus, with scores of not more than 2. Zonate leaf (score 2) was present in one entry in the second replication of the West African Sorghum Hybrid Adaptation Trial (WASHAT). Almost all the entries in WASHAT were in the milk stage.

Only 10 of the 42 entries in the unreplicated parent trial were infected in the top 4 leaves. Eight of these entries had scores of 2 for either grey leaf spot, leaf anthracnose, zonate leaf spot or oval leaf spot. One entry (MR 821) had a score of 4 for sooty stripe, and another (IRAT 55) had a 2 for grey leaf spot.

3.2. Sorghum Diseases in Farmers' Fields

The incidence and severity of the diseases observed in 6 farmers' fields are given in Table 5.

Table 5. Incidence (INC) and severity (SEV) of sorghum diseases in 6 farmers' fields in the Extreme North Province of Cameroon. October 1987.

Location	ZIVER		GUETALE		MARCUA		LARA		YAGCUA		MOU; VOUDAY	
Growth stage	milk		dough		dough		dough		mature		milk	
Disease	INC(1)	SEV	INC	SEV	INC	SEV	INC	SEV	INC	SEV	INC	SEV
Gre. leaf spot	70	2.1	20	2.0	0	ND(2)	7	2.0	0	ND	15	2.0
Anthracnose	67	2.0	46	2.8	0	ND	0	ND	22	2.1	0	ND
Oval leaf spot	8	2.0	99	2.4	78	2.0	0	ND	95	2.4	0	ND
Zonate leaf spot	0	ND	0	ND	0	ND	0	ND	0	ND	2	2.0
Leaf blight	2	2.0	0	ND	0	ND	52	2.0	0	ND	4	2.0
Yellow leaf blotch	0	ND	0	ND	0	ND	0	ND	0	ND	12	2.0
Grain mold	0	ND	0	ND	0	ND	0	ND	2	4.0	0	ND
Long smut	0	ND	2	2.0	0	ND	0	ND	0	ND	0	ND
Head smut	0	ND	4	2.0	0	ND	2	2.0	0	ND	0	ND
Striga	0	ND	95	ND	98	ND	7	ND	0	ND	0	ND

1. Incidence based on per cent plants with the disease from 100 plants per farm. Severity is based on a scale of 1 to 6 for leaf diseases and is expressed as a mean of the number of plants with the given disease. GM, LS and MS are incidence scores based on a scale of 1 to 5. Incidence of Striga is based on the number of sorghum plants out of 100 with one or more Striga plants within 10 cm radius. See page 2 for explanation of disease scales.
2. ND=Not determined.

3.3 Pearl Millet Diseases on Breeders' Material and Germplasm

870 collections of germplasm originated from Cameroon have been evaluated for smut, ergot, and leave diseases. The maturity range was between leaf boot stage to milk stage. Only 432 entries could be evaluated for panicle diseases as the other entries didn't yet flower. Only 9.8% of the evaluated entries showed ergot and only 2.0% of the entries showed smut. No DM was observed in this nursery. Incidence of leaf diseases (=% of entries showing leaf diseases symptom) was very low: Pyricularia grisea 7.5% incidence, bacterial stripe 2.9%, and rectangular leaf spot (Ramulispora sp.) 1.3% (Annexe I). Very rare insect damage could be observed and it was only stem borer, (1.6% incidence).

A Preliminary Pearl Millet Trial with 13 entries and three replications were evaluated for diseases. The millet plants were at dough stage. Only one entry in one replication had some ergot. Smut severity was higher but still not of any significance. The inicidence of the leaf spot disease Pyricularia was 85% but the severity was only 1-10% and in addition the disease appears normally very late in the season and the influence on the yield is of no importance (Table 6).

Table 6. Results of disease observations of Preliminary Pearl Millet Yield Trial, Guiring station, Maroua, Cameroon, rainy season 1987 (Date of observation: 2/10/87).

Entry	Ergot Severity (%)				Smut Severity (%)				Rectangular leaf spot Severity (1-5)				Leaf Blast Severity (1-5)			
	R1	R2	R3	Mean	R1	R2	R3	Mean	R1	R2	R3	Mean	R1	R2	R3	Mean
CPM 1	0	0	0	0	0	6	0	2.00	1	1	1	1.00	2	1	1	1.33
CPM 2	0	0	0	0	0	0	0	0	1	1	1	1.00	1	1	1	1.00
CPM 3	0	0	0	0	0	0	0	0	1	1	1	1.00	2	3	2	2.33
CPM 4	0	0	0	0	0	0	0	0	1	1	1	1.00	2	3	1	2.00
CPM 5	0	0	0	0	0	5	0	1.67	1	1	1	1.00	2	2	3	2.33
CPM 6	0	0	0	0	5	0	0	1.67	1	1	1	1.00	2	2	2	2.00
CPM 7	0	0	0	0	3	4	0	2.33	2	1	1	1.33	1	1	2	1.33
CPM 8	5	0	0	1.67	0	0	0	0	1	1	1	1.00	1	1	3	1.67
CPM 9	0	0	0	0	0	0	0	0	1	1	1	1.00	2	1	1	1.33
CPM 10	0	0	0	0	0	0	0	0	1	1	1	1.00	1	1	2	1.33
CPM 11	0	0	0	0	0	0	0	0	1	1	1	1.00	1	1	2	1.33
CPM 12	0	0	0	0	0	3	0	1.00	1	1	1	1.00	1	2	2	1.67
HOSARI	0	0	0	0	0	0	0	0	1	1	1	1.00	1	1	1	1.00
Mean				.13				.67				1.03				1.59

3.4 Pearl Millet Diseases in Farmers' Fields

As the time was limited, only a few farmers' fields could be scored for millet diseases. We spent three days in the main millet and sorghum growing area of the north of Cameroon for disease observations (see Fig. 1).

The maturity of the millet plants ranged between flowering and dough stage. All the diseases of pearl millet occured in this area but the incidence was generally very low without causing any economic losses (Table 7). The highest incidence was found on DM with a mean of 17.5% (10-29%), smut with a mean of 3.9% (0-15%), and ergot with a mean of 2.3% (0-10%). Leaf diseases occured everywhere but were of no importance. It is interesting to notice that hardly any Striga could be found in the mountain area between Mokolo and Mora, but on the other hand Striga on sorghum was very frequent. The same was observed around Maroua and between Maroua and Mora. However, between Yagoua and Moulvouday, we encountered millet fields with heavy Striga infestation.

Table 7. Disease observations in farmers' fields in the North of Cameroon, rainy season 1987, Date of observation: 30 September to October, 1987.

Location	ZIVEH		MOKOLO		GUETALE 1		GUETALE 2		LARA		GUIDIGIS		YAGOUA		MOULVOUDAY		MEAN	
Disease	INC(1)	SEV 2)	INC	SEV	INC	SEV	INC	SEV	INC	SEV	INC	SEV	INC	SEV	INC	SEV	INC	SEV
Downy Mildew	12.00	3.25	10.00	3.50	10	1.25	14	5	13	3.5	20	8.5	24	10	10	1.25	12.07	5.13
Smut	1.00	5.00	0	0	3	0	15	11.1	0	ND(3)	0	5.3	0	ND	3	6.3	4.01	3.46
Ergot	1.00	1.00	10.00	5.00	1	5	2	12.5	3	4.3	1	4.2	0	ND	0	0	3.33	3.30
Rectangular leaf spot	10.00	3.30	3.00	2.00	0	ND	2	3	2	5	1	5	5	5	10	4.0	4.00	3.40
Leaf blast	0	ND	0	ND	0	ND	1	5	0	ND	6	5	21	7	0	ND	3.00	2.13
Zonate leaf spot	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	4	5	0	ND	.60	.63
Bacterial stripe	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	4	5	0	ND	.60	.63
Striga	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	1	ND	100	ND	12.03	ND

1. INC=Incidence in %, 2. SEV=Severity in %, 3. ND=not determined

4. CONCLUSION

4.1. Sorghum Diseases

Many entries in the experimental trials at the Guiring Station were free of disease in the top 4 leaves. When a disease was recorded in these trials the severity rarely exceeded 2. This should be expected since the rainfall in the Extreme North is relatively low. For example, the average rainfall for the 5 years between 1982 and 1986 at the Guiring Station was 564 mm. It should be noted also that many of the entries were in the milk stage and that the severity of some of the diseases might increase later, depending on favourable weather conditions. Diseases such as grain mold, long smut, stalk rot and perhaps sooty stripe should be monitored at a later stage of the crop.

It is highly recommended that promising breeders materials should be grown in the 1000 to 1500 mm rainfall zone for at least 2 years. It is believed that this will expose the materials to a much higher disease pressure especially for diseases such as grey leaf spot and grain mold.

No concrete conclusions can be drawn from the data obtained from the 6 farmers' fields. The number of farms visited was extremely small and even generalizations must be treated with caution. Grey leaf spot and oval leaf spot appeared to be more prevalent in farmers' fields. This suggests that introduced and improved materials need to be more closely watched for these 2 leaf diseases. The presence of the other diseases in local varieties indicate that the inoculum is already present locally as is the case for grey and oval leaf spots and that breeders' materials should be monitored for these other diseases. The type and frequency of occurrence of the diseases on local varieties might change as one moves further south from Maroua where rainfall is higher. Leaf anthracnose in local varieties was mostly expressed as mid-rib infection with numerous pin head size necrotic spots on the leaf lamina. This type of host reaction to C. graminicola, which resembles a hypersensitive reaction, has been seen in numerous local varieties in several West African countries. In the farmer's field at Yagoua grain mold was observed in a few other plants which were not included in the 100-plant sample. A Fusarium sp. and a fungus with black velvety growth, most likely Curvularia lunata were observed. The grains were red, but a little lighter than the usual dark red of local varieties.

4.2 Pearl Millet Diseases

Most entries of the breeding material and germplasm was disease free at the Guiring station near Maroua. This is not surprising as there was not much rain in 1987 and the on-set of the rains was about six weeks retarded and in addition the rains were not well distributed.

From the visit of farmers' fields conclusions can be drawn only with precaution as only a limited number of farms has been visited and the season had poor rains. However the results show that downy mildew was observed in all the fields but none of the fields showed high DM infection that could cause any substantial yield losses. In opposition to this we found only a few millet fields with Striga infestation, but the infested fields yielded

definitely much less than the fields without Striga. All the other millet diseases we found in farmers' fields were of no importance as yield reducers.

From a pathological point of view we would recommend to screen promising breeders' material for DM in a higher rainfall area (ca. 1000 mm) than Guiring. Advanced millet lines and varieties should also be screened for Striga reaction as it is beeing done for sorghum.

4.3. Striga on sorghum and Pearl Millet

The situation with Striga was striking. Because of time constraint not all the many farmers' fields highly infested with Striga were assessed for Striga infection. However, the 2 farms having Striga incidence of 95 and 98% (Table 5) illustrate the abundance of Striga in many farmers' fields.

Three points are worth noting. First, Striga on sorghum was much more prevalent west and north of Maroua, up to Mokolo and Mora, respectively. In contrast, much less Striga was seen on sorghum southeast and east of Maroua, towards Guidiguis, Yagoua and Moulvouday. Secondly, typical symptoms from Striga infection were rare on sorghum in farmers' fields. None of the 200 plants observed in the 2 fields reported in Table 5 showed Striga symptoms. This is in contrast to pearl millet which was heavily attacked by Striga south and east of Maroua and in which symptoms were evident. For the most part, the Striga plants on sorghum were well developed with evidence of vigorous growth. Lastly, between Yagoua and Moulvouday, there were few farms in which sorghum was intercropped with pearl millet and in which Striga was present. It was observed that there were much more Striga on the pearl millet than on the sorghum. More emphasis should be placed on Striga research in Cameroon.

ACKWOLEDGEMENT

We would like to thank the National Cereals Research and Extension Program of I.R.A. for the exellent organisation of the visit, the fruitful and open discussions and for providing us transport to visit farmers' fields.

ANNEX 1

Disease Evaluation of Pearl Millet Germplasm Lines of Cameroon, 1987

Date of observation: 28/9/87

1 IP No./Pedigree

2 Ergot Severity (%), *Claviceps fusiformis*

3 Smut Severity (%), *Tolyposporium penicillariae*

4 Severity of *Piricularia grisea* (leaf spot)

5 Severity of *Ramulispora* sp. (leaf spot)

6 Severity of Bacterial stripe, *Xanthomonas campestri* pv.*holcicola*

7 Severity of stem borer, *Coniesta ignefusalis*

No.	1	2	3	4	5	6	7
1	6114	2	1	1	1	1	1
2	6115	2	2	1	1	1	1
3	6116	1	1	1	1	1	1
4	6117	1	1	1	1	1	1
5	6118	2	1	1	1	1	1
6	6119	2	1	1	1	1	1
7	6120	2	1	1	1	1	1
8	6121	1	1	1	1	1	1
9	6122	1	1	1	1	1	1
10	6123	1	1	1	1	1	1
11	6124	1	1	1	1	1	1
12	6125	1	1	1	1	1	1
13	6126	1	1	1	1	1	1
14	6127	1	1	1	1	1	1
15	6128	1	1	1	1	1	1
16	6129	1	1	1	1	1	1
17	6130	1	1	1	1	1	1
18	6131	1	2	1	1	1	1
19	6132	1	1	1	1	1	1
20	6133	1	1	1	1	1	1
21	6134	0	0	1	1	1	1
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26	6139	0	0	1	1	1	1
27	6140	0	0	1	1	1	1
28	6141	1	1	1	1	1	1
29	6142	1	1	1	1	1	1
30	6143	1	1	1	1	1	1
31	6144	1	1	1	1	1	1
32	6145	1	1	1	1	1	1
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35	6148	0	0	1	1	1	1
36	6149	0	0	1	1	1	1
37	6150	1	1	1	1	1	1
38	6151	2	1	1	1	1	1
39	6152	1	1	1	1	1	1
40	6153	0	0	1	1	1	1
41	6154	1	1	1	1	1	1
42	6155	0	0	1	1	1	1
43	6156	1	1	1	1	1	1
44	6157	1	1	1	1	1	1
45	6158	0	0	1	1	1	1
46	6159	1	1	1	1	1	1
47	6160	0	0	1	1	1	1
48	6161	2	1	1	1	1	1
49	6162	1	1	1	1	1	1
50	6163	1	1	1	1	1	1
51	6164	0	0	1	1	1	1
52	6165	1	1	1	1	1	1
53	6166	2	1	1	1	1	1
54	6167	2	2	1	1	1	1
55	6168	2	1	1	1	1	1
56	6169	0	0	1	1	1	1
57	6170	1	1	1	1	1	1
58	6171	1	1	1	1	1	1
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60	6173	1	1	1	1	1	1
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65	6178	2	1	1	1	2	1
66	6179	1	1	1	1	1	1
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69	6182	1	1	1	1	1	1
70	6183	0	0	1	1	1	1
71	6184	1	1	1	1	1	1
72	6185	1	1	1	1	1	1
73	6186	0	0	1	1	1	1
74	6187	1	1	1	1	1	1
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79	6192	1	1	1	1	1	1
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81	6194	1	1	1	1	1	1
82	6195	1	1	1	1	1	1
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84	6197	1	1	1	1	1	1
85	6198	1	1	1	1	1	1
86	6199	0	0	1	1	1	1
87	6200	0	0	1	1	1	1
88	6201	0	0	1	1	1	1
89	6202	1	1	1	1	1	1
90	6203	0	0	1	1	1	1
91	6204	1	1	1	1	1	1
92	6205	1	1	2	1	1	1
93	6206	1	1	1	1	1	1
94	6207	1	1	1	1	1	1
95	6208	0	0	1	1	1	1
96	6209	0	0	1	1	1	1
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102	6215	1	1	1	1	1	1
103	6216	0	0	1	1	1	1
104	6217	0	0	1	1	1	1
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106	6219	1	1	1	1	1	1
107	6220	1	1	1	1	1	1
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109	6222	1	1	1	1	1	1
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112	6225	1	1	1	1	1	1
113	6226	1	1	1	1	1	1
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115	6228	0	0	1	1	1	1
116	6229	3	1	1	1	1	1
117	6230	3	1	1	1	1	1
118	6231	3	1	1	1	1	1
119	6232	3	1	1	1	1	1
120	6233	2	2	1	1	1	1
121	6234	2	1	1	1	1	1
122	6235	2	1	1	1	1	1
123	6236	0	0	1	1	1	1
124	6237	2	1	1	1	1	1
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136	6249	2	1	1	1	1	1
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139	11630	1	1	1	1	1	1
140	11631	1	3	1	1	1	1
141	11632	2	1	1	1	1	1
142	11633	1	1	1	1	1	1
143	11634	1	1	1	1	1	1
144	11635	1	1	1	1	1	1
145	11636	2	1	1	1	1	1
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152	11643	2	1	1	1	1	1
153	11644	1	1	1	1	1	1
154	11645	1	1	1	1	1	1
155	11646	2	1	2	1	1	1
156	11647	2	1	2	1	1	1
157	14183	1	1	2	1	1	1
158	14184	1	1	2	1	1	1
159	14185	1	1	1	1	1	1
160	14186	1	1	1	1	1	1
161	14187	0	0	1	1	1	1
162	14188	0	0	1	1	1	1
163	14189	0	0	1	1	1	1
164	14190	1	1	1	1	1	1
165	14191	1	1	1	1	1	1
166	14192	1	1	1	1	1	1
167	14193	0	0	1	1	1	1
168	14194	1	1	1	1	1	1
169	14195	2	1	1	1	1	1
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171	14197	1	1	1	1	1	1
172	14198	1	1	1	1	1	1
173	14199	2	1	1	1	1	1
174	14200	1	1	1	1	1	1
175	14201	1	1	1	1	1	1
176	14202	0	0	1	1	1	1
177	14203	1	1	1	1	1	1
178	14204	1	1	1	1	1	1
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184	14210	1	1	1	1	1	1
185	14211	1	1	1	1	1	1
186	14212	1	1	1	1	1	1
187	14213	1	1	1	1	1	1
188	14214	1	2	1	2	1	1
189	14215	1	1	1	1	1	1
190	14216	0	0	1	1	1	1
191	14217	0	0	1	1	1	1
192	14218	1	1	1	1	1	1
193	14219	1	1	3	1	1	1
194	14220	2	2	3	1	1	1
195	14221	2	2	3	1	1	1
196	14222	1	1	2	1	1	1
197	14223	1	1	2	1	1	1
198	14224	0	0	1	1	1	1
199	14225	0	0	1	1	1	1
200	14226	1	1	2	1	1	1
201	14227	2	1	2	1	1	1
202	14228	1	1	2	1	1	1
203	14229	1	1	2	1	1	1
204	14230	1	1	2	1	1	1
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207	14233	1	1	1	1	1	1
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210	14236	0	0	1	1	1	1
211	14237	1	1	2	1	1	1
212	14238	1	1	2	1	1	1
213	14239	1	1	1	1	1	1
214	14240	1	1	1	2	1	1
215	14241	1	1	1	1	1	1
216	14242	1	2	1	1	1	1
217	14243	1	1	1	1	1	1
218	14244	1	1	1	1	1	1
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220	14246	1	2	2	1	1	1
221	14247	1	1	1	1	1	1
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231	14257	1	1	1	1	1	1
232	14258	2	1	1	1	1	1
233	14259	1	1	1	1	1	1
234	14260	0	0	1	1	1	1
235	14261	0	0	1	1	1	1
236	14262	0	0	1	1	1	1
237	14264	1	1	1	1	1	1
238	14265	1	1	1	1	1	1
239	14266	1	1	1	1	1	1
240	14267	1	1	1	1	1	1
241	14268	2	1	1	1	1	1
242	14269	0	0	1	1	1	1
243	14270	0	0	1	1	1	1
244	14271	3	1	1	1	1	1

No.	1	2	3	4	5	6	7
205	14272	3	1	1	1	1	1
206	14273	1	1	1	1	1	1
207	14274	3	1	1	1	1	1
208	14275	1	2	2	1	1	1
209	14276	1	1	1	1	1	1
210	14277	0	0	1	1	1	1
211	14278	0	0	1	1	1	1
212	14279	0	0	1	1	1	1
213	14280	2	1	1	1	1	1
214	14281	1	1	1	1	1	1
215	14282	2	1	1	1	1	1
216	14283	2	1	1	1	1	1
217	14284	2	1	1	1	1	1
218	14285	0	0	1	1	1	1
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220	14287	0	0	1	1	1	1
221	14288	0	0	1	1	1	1
222	14289	0	0	1	1	1	1
223	14290	1	1	1	1	1	1
224	14291	1	1	2	1	1	1
225	14292	1	1	2	1	1	1
226	14293	1	1	2	1	1	1
227	14294	2	1	1	1	1	1
228	14295	2	1	1	1	1	1
229	14296	1	1	1	1	1	1
230	14297	1	1	1	1	1	1
231	14298	1	1	1	1	1	1
232	14299	1	1	1	1	1	1
233	14300	1	1	1	1	1	1
234	14301	2	1	1	1	1	1
235	14302	2	1	1	1	1	1
236	14303	1	1	1	1	1	1
237	14304	0	0	1	1	1	1
238	14305	0	0	1	1	1	1
239	14306	1	1	1	1	1	1
240	14307	1	1	1	1	1	1
241	14308	0	0	1	1	1	1
242	14309	2	1	1	1	1	1
243	14310	1	1	1	1	1	1
244	14311	2	1	1	1	1	1
245	14312	1	1	1	1	1	1
246	14313	0	0	1	1	1	1
247	14314	2	1	2	1	1	1
248	14315	0	0	1	1	1	1
249	14316	1	1	1	1	1	1
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255	14322	1	1	1	1	1	1
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258	14325	2	1	1	1	1	1
259	14326	1	1	2	1	1	1
260	14327	1	1	2	1	1	1
261	14328	2	1	1	1	1	1
262	14329	1	1	1	1	1	1
263	14330	1	1	1	1	1	1
264	14331	1	1	2	1	1	1
265	14332	1	1	1	1	1	1

No.	1	2	3	4	5	6	7
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307	14334	1	1	1	1	1	1
308	14335	1	1	1	1	1	1
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310	14338	1	1	1	1	1	1
311	14339	1	1	1	1	1	1
312	14340	1	1	1	1	1	1
313	14341	1	1	1	1	1	1
314	14342	1	1	1	1	1	1
315	14343	0	0	1	1	1	1
316	14344	0	0	1	1	1	1
317	14345	0	0	1	1	1	1
318	14346	1	1	1	1	1	1
319	14347	1	1	1	1	1	1
320	14348	0	0	1	1	1	1
321	14349	0	0	1	1	1	1
322	14350	0	0	1	1	1	1
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327	14355	0	0	1	1	1	1
328	14356	0	0	1	1	1	1
329	14357	0	0	1	1	1	1
330	14358	0	0	1	1	1	1
331	14359	0	0	1	1	1	1
332	14360	3	1	1	1	1	1
333	14361	1	1	1	1	1	1
334	14362	2	1	1	1	1	1
335	14363	2	1	1	1	1	1
336	14364	0	0	1	1	1	1
337	14365	1	1	1	1	1	1
338	14367	1	1	1	1	1	1
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342	14371	0	0	1	1	1	1
343	14372	0	0	1	1	1	1
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346	14376	0	0	2	1	1	1
347	14377	0	0	1	1	1	1
348	14378	1	1	1	1	1	1
349	14379	0	0	1	1	1	1
350	14380	1	1	1	1	1	1
351	14381	0	0	2	1	1	1
352	14382	0	0	1	1	1	1
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356	14386	0	0	1	1	1	1
357	14387	0	0	1	1	1	1
358	14388	2	1	1	1	1	1
359	14389	0	0	1	1	1	1
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362	14392	0	0	1	1	1	1
363	14393	0	0	1	1	1	1
364	14394	0	0	1	1	1	1
365	14395	0	0	1	1	1	1
366	14396	0	0	1	1	1	1

No.	1	2	3	4	5	6	7
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368	14398	0	0	1	1	1	1
369	14399	0	0	1	1	1	1
370	14400	0	0	1	1	1	1
371	14401	0	0	1	1	1	1
372	14402	0	0	1	1	1	1
373	14403	0	0	1	1	1	1
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377	14407	1	1	1	1	1	1
378	14408	3	1	1	1	1	1
379	14409	1	1	2	1	1	1
380	14410	1	1	3	1	1	1
381	14411	1	1	1	1	1	1
382	14412	0	0	1	1	1	1
383	14413	2	1	1	1	1	1
384	14414	1	1	1	1	1	1
385	14415	1	1	1	1	1	1
386	14416	0	0	1	1	1	2
387	14417	0	0	1	1	1	1
388	14418	2	1	1	1	1	1
389	14419	2	1	1	1	1	1
390	14420	0	0	1	1	2	1
391	14421	0	0	1	1	1	1
392	14422	0	0	1	1	1	1
393	14423	1	1	1	1	1	1
394	14424	2	1	1	1	1	1
395	14425	1	1	1	1	1	1
396	14426	1	1	1	1	1	1
397	14427	2	1	1	1	1	1
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400	14430	1	1	1	1	2	1
401	14431	1	1	3	1	1	1
402	14432	0	0	1	1	1	1
403	14433	1	1	1	1	1	1
404	14434	1	1	1	1	1	1
405	14436	2	1	1	1	1	1
406	14437	2	1	1	1	1	1
407	14439	1	1	1	1	1	1
408	14440	1	1	1	1	1	1
409	14441	1	1	3	1	1	1
410	14442	1	1	2	1	1	1
411	14443	1	1	1	1	1	1
412	14444	1	1	1	1	1	1
413	14445	1	1	1	1	1	1
414	14446	1	1	1	1	1	1
415	14447	1	1	1	1	1	1
416	14448	1	1	1	1	1	1
417	14449	1	1	1	1	1	1
418	14450	1	1	3	1	1	1
419	14451	2	1	1	1	1	1
420	14452	1	1	1	1	1	1
421	14453	2	1	1	1	1	1
422	14454	1	1	1	1	1	1
423	14455	2	1	1	1	1	1
424	14456	1	1	1	1	1	1
425	14457	0	0	1	1	1	1
426	14458	1	1	1	1	1	1
427	14459	2	1	1	1	1	1

No.	1	2	3	4	5	6	7
428	14460	2	1	1	1	1	1
429	14461	0	0	1	1	1	1
430	14462	0	0	1	1	1	1
431	14463	0	0	1	1	1	1
432	14464	0	0	1	1	1	1
433	14465	0	0	1	1	1	1
434	14466	0	0	1	1	1	1
435	14467	0	0	1	1	2	1
436	14468	0	0	1	1	1	1
437	14469	0	0	1	1	1	1
438	14470	0	0	1	1	1	1
439	14471	1	1	1	1	1	1
440	14472	0	0	1	1	1	1
441	14473	0	0	1	1	1	1
442	14474	0	0	1	1	1	1
443	14475	0	0	1	1	1	1
444	14476	1	1	1	1	1	1
445	14477	1	1	1	1	1	1
446	14478	0	0	1	1	1	1
447	14479	0	0	1	1	1	1
448	14480	1	1	1	1	1	1
449	14481	0	0	1	1	1	1
450	14482	0	0	1	1	1	1
451	14483	0	0	1	1	1	1
452	14484	0	0	1	1	1	1
453	14485	0	0	1	1	1	1
454	14486	0	0	1	1	2	1
455	14487	0	0	1	1	1	1
456	14488	1	1	1	1	1	1
457	14489	0	0	1	1	2	1
458	14490	0	0	1	1	1	1
459	14491	0	0	1	1	1	1
460	14492	0	0	1	1	1	1
461	14493	0	0	1	3	1	1
462	14494	0	0	2	1	1	1
463	14495	1	1	1	1	1	1
464	14496	0	0	2	1	1	1
465	14497	1	1	1	1	1	1
466	14498	0	0	1	1	1	1
467	14499	2	1	1	1	1	1
468	14500	1	1	2	1	1	1
469	14501	1	1	1	1	1	1
470	14502	1	1	1	1	1	1
471	14503	2	1	2	1	1	1
472	14504	0	0	1	1	1	1
473	14505	2	1	1	1	1	1
474	14506	1	1	1	1	1	1
475	14507	1	1	1	1	1	1
476	14508	0	0	1	1	1	1
477	14509	0	0	1	1	1	1
478	14510	0	0	1	1	1	1
479	14511	0	0	1	1	1	1
480	14512	0	0	1	1	1	1
481	14513	1	1	1	1	1	1
482	14514	1	1	1	1	1	1
483	14515	0	0	1	1	1	1
484	14516	0	0	1	1	1	1
485	14517	1	1	1	1	1	1
486	14518	1	1	1	1	1	1
487	14519	1	1	1	1	1	1
488	14520	1	1	1	1	1	1

No.	1	2	3	4	5	6	7
489	14521	0	0	1	1	1	1
490	14522	0	0	1	1	1	1
491	14523	0	0	1	1	1	1
492	14524	1	1	1	1	1	1
493	14525	2	1	1	1	1	1
494	14526	0	0	1	1	1	1
495	14527	1	1	1	1	1	2
496	14528	0	0	1	1	1	1
497	14529	0	0	1	1	1	1
498	14530	0	0	1	1	1	1
499	14531	0	0	1	1	1	1
500	14532	1	1	1	1	2	1
501	14533	1	1	1	1	2	1
502	14534	0	0	1	1	1	1
503	14535	0	0	1	1	1	1
504	14536	1	1	1	1	1	1
505	14537	0	0	1	1	2	1
506	14538	1	1	1	1	1	1
507	14539	1	1	1	1	1	1
508	14540	1	1	1	1	1	1
509	14541	0	0	1	2	1	1
510	14542	0	0	1	1	1	1
511	14543	0	0	1	1	1	1
512	14544	0	0	1	1	1	1
513	14545	0	0	1	1	1	1
514	14546	0	0	1	3	1	1
515	14547	0	0	1	1	1	1
516	14548	0	0	1	1	1	1
517	14549	0	0	1	1	1	1
518	14550	1	1	1	1	1	1
519	14551	1	1	1	1	1	1
520	14552	1	1	1	1	1	1
521	14553	1	1	1	3	1	1
522	14554	0	0	1	1	1	1
523	14555	0	0	1	1	1	1
524	14556	0	0	1	1	1	1
525	14557	0	0	1	1	1	1
526	14558	0	0	1	1	1	1
527	14559	0	0	1	1	1	1
528	14560	0	0	1	1	1	1
529	14561	2	1	1	1	1	1
530	14562	0	0	1	1	1	1
531	14563	0	0	1	1	1	1
532	14564	0	0	1	1	1	1
533	14565	0	0	1	1	1	1
534	14566	0	0	1	1	1	1
535	14567	0	0	2	1	1	1
536	14568	0	0	1	1	2	1
537	14569	0	0	1	1	3	1
538	14570	0	0	1	1	3	1
539	14571	0	0	1	1	3	1
540	14572	0	0	1	1	1	1
541	14573	0	0	1	1	1	1
542	14574	0	0	1	1	1	1
543	14575	0	0	1	1	1	2
544	14576	0	0	1	1	1	2
545	14577	1	1	1	1	1	1
546	14578	0	0	1	1	1	1
547	14579	1	1	1	1	1	1
548	14580	1	0	2	1	1	1
549	14581	0	0	2	1	1	1
550	14582	1	1	1	1	1	1
551	14583	0	0	1	1	1	1
552	14584	1	1	1	1	1	1
553	14585	0	0	1	1	1	1
554	14586	1	1	2	1	2	1
555	14587	1	1	1	1	1	1
556	14588	0	0	1	1	2	1
557	14589	0	0	2	2	1	1
558	14590	0	0	1	1	1	1
559	14591	0	0	1	1	1	1
560	14592	0	0	1	1	1	1
561	14593	0	0	1	1	1	1
562	14594	0	0	1	1	2	1
563	14595	0	0	1	1	1	1
564	14596	0	0	1	1	1	1
565	14597	0	0	1	1	1	1
566	14598	1	1	1	1	1	1
567	14599	1	1	1	1	1	1
568	14600	0	0	1	1	1	1
569	14601	1	1	1	1	1	1
570	14602	2	1	1	1	1	1
571	14603	1	1	1	1	1	1
572	14604	0	0	1	1	1	1
573	14605	0	0	1	1	1	1
574	14606	1	1	1	1	1	1
575	14607	1	1	1	1	1	1
576	14608	1	1	1	1	1	1
577	14609	1	1	2	1	1	1
578	14610	1	1	1	1	1	1
579	14611	1	1	1	1	1	1
580	14612	1	1	1	1	1	1
581	14613	0	1	1	1	1	1
582	14614	1	1	1	1	1	1
583	14615	0	0	1	1	1	1
584	14616	1	1	1	1	1	1
585	14617	1	1	1	1	1	1
586	14618	0	0	1	1	1	1
587	14619	0	0	2	1	1	2
588	14620	1	1	1	1	2	2
589	14621	1	1	1	1	1	1
590	14622	0	0	1	1	2	1
591	14623	0	0	1	1	1	1
592	14624	0	0	1	1	1	1
593	14625	0	0	1	1	1	1
594	14626	0	0	1	1	1	1
595	14627	1	1	1	1	1	1
596	14628	1	1	1	1	1	1
597	14629	0	0	2	1	1	1
598	14630	1	1	1	1	1	1
599	14631	0	0	1	1	1	1
600	14632	1	1	1	1	1	1
601	14633	2	1	1	1	1	1
602	14634	1	1	1	1	1	1
603	14635	1	1	1	1	1	1
604	14636	0	0	1	1	1	1
605	14637	1	1	1	1	1	1
606	14638	1	1	1	1	1	1
607	14639	1	1	1	1	1	1
608	14640	1	1	1	1	1	1
609	14641	1	1	1	1	1	2
610	14642	1	1	1	1	1	1
611	14643	1	1	1	1	1	2
612	14644	1	1	1	1	1	1
613	14645	0	0	1	1	1	1
614	14646	0	0	1	1	1	1
615	14647	1	1	1	1	1	1
616	14648	1	1	1	1	1	1
617	14649	2	1	1	1	1	1
618	14650	1	1	1	1	1	1
619	14651	0	0	1	1	1	1
620	14652	0	0	1	1	1	1
621	14653	1	1	1	1	1	1
622	14654	1	1	1	1	1	1
623	14655	0	0	1	1	1	1
624	14656	1	1	1	1	1	1
625	14657	0	0	1	1	1	1
626	14658	0	0	1	1	1	1
627	14659	0	0	1	1	1	1
628	14660	0	0	1	1	1	1
629	14661	1	1	1	1	1	1
630	14662	0	0	1	1	1	1
631	14663	1	1	1	1	1	1
632	14664	2	1	1	1	1	1
633	14665	1	1	1	1	1	1
634	14666	0	0	1	2	2	1
635	14667	0	0	1	1	1	1
636	14668	1	1	1	1	1	1
637	14669	0	0	1	1	1	1
638	14670	0	0	1	1	1	1
639	14671	0	0	1	1	1	1
640	14672	0	0	2	1	2	1
641	14673	0	0	1	1	1	1
642	14674	1	1	2	1	1	1
643	14675	1	1	1	1	1	1
644	14676	1	1	1	1	1	1
645	14677	1	1	1	1	1	1
646	14678	0	0	1	1	1	1
647	14679	0	0	1	1	1	1
648	14680	0	0	1	1	1	1
649	14681	0	0	1	1	1	1
650	14682	0	0	1	1	1	2
651	14683	1	1	1	1	1	1
652	14684	1	1	1	1	1	1
653	14685	2	1	2	1	1	1
654	14686	1	1	2	1	1	1
655	14687	0	0	1	1	1	1
656	14688	0	0	1	1	1	1
657	14689	0	0	1	1	1	1
658	14690	0	0	2	1	1	1
659	14691	1	1	1	1	1	1
660	14692	1	1	1	1	1	1
661	14693	1	1	1	1	1	1
662	14694	1	1	1	1	2	1
663	14695	0	0	1	1	1	1
664	14696	0	0	1	1	1	1
665	14697	0	0	1	2	1	1
666	14698	2	1	2	1	1	1
667	14699	1	1	1	1	2	1
668	14700	0	0	1	1	1	1
669	14701	0	0	1	1	1	1
670	14702	1	1	2	1	1	1
671	14703	1	1	1	1	1	1
672	14704	0	0	1	1	1	1
673	14705	0	0	1	1	1	1
674	14706	0	0	2	1	1	1
675	14707	1	1	1	1	1	1
676	14708	1	1	2	1	1	1
677	14709	0	0	1	1	1	1
678	14710	0	0	1	1	1	1
679	14711	0	0	1	1	1	1
680	14712	0	0	1	1	1	1
681	14713	0	0	1	1	1	1
682	14714	1	1	1	1	1	1
683	14715	1	1	1	1	1	1
684	14716	2	1	1	1	1	1
685	14717	0	0	1	1	1	1
686	14718	0	0	1	1	1	1
687	14719	3	1	1	1	1	2
688	14720	1	1	1	1	1	1
689	14721	2	1	1	1	1	1
690	14722	2	1	1	1	1	1
691	14723	2	1	1	1	1	1
692	14724	0	0	1	1	1	1
693	14725	1	1	1	1	1	1
694	14726	1	1	1	1	1	1
695	14727	1	1	1	1	1	1
696	14728	0	0	1	1	1	1
697	14729	0	0	1	1	2	1
698	14730	1	1	1	1	1	1
699	14731	1	1	1	1	1	1
700	14732	1	1	1	1	1	1
701	14733	1	1	1	1	1	1
702	14734	1	1	1	1	1	1
703	14735	0	0	1	1	1	1
704	14736	0	0	1	1	2	1
705	14737	0	0	1	1	2	1
706	14738	0	0	1	1	1	1
707	14739	0	0	1	1	1	1
708	14740	0	0	1	1	1	1
709	14741	0	0	1	1	1	1
710	14742	0	0	1	1	1	1
711	14743	0	0	1	1	1	1
712	14744	0	0	1	1	2	1
713	14745	0	0	1	1	1	1
714	14746	0	0	1	1	1	1
715	14747	0	0	1	1	1	1
716	14748	0	0	1	1	1	1
717	14749	1	1	2	1	1	1
718	14750	0	0	1	1	1	1
719	14751	1	1	1	1	1	1
720	14752	1	1	1	1	1	1
721	14753	1	1	1	1	1	1
722	14754	0	0	1	1	1	1
723	14755	1	1	1	1	1	1
724	14756	0	0	1	1	1	1
725	14757	0	0	1	1	1	1
726	14758	0	0	1	1	1	1
727	14759	0	0	1	1	1	1
728	14760	0	0	1	1	1	1
729	14761	1	1	1	1	1	1
730	14762	0	0	1	1	1	1
731	14763	0	0	1	1	1	1
732	14764	0	0	1	1	1	1

No.	1	2	3	4	5	6	7
733	14765	0	0	2	1	1	1
734	14766	1	1	1	2	1	2
735	14767	0	0	1	1	1	1
736	14768	0	0	1	1	1	1
737	14769	0	0	1	1	1	1
738	14770	2	1	1	1	1	1
739	14771	0	0	1	1	1	1
740	14772	0	0	1	1	1	1
741	14773	0	0	1	1	1	1
742	14774	0	0	1	1	1	1
743	14775	0	0	1	1	1	1
744	14776	0	0	1	1	1	1
745	14777	0	0	1	1	1	1
746	14778	0	0	1	1	1	1
747	14779	0	0	1	1	1	1
748	14780	0	0	1	1	1	1
749	14781	0	0	1	1	1	1
750	14782	0	0	1	1	1	1
751	14783	1	1	1	1	1	1
752	14784	0	0	1	1	1	1
753	14785	0	0	1	1	1	1
754	14786	0	0	1	1	1	1
755	14787	0	0	1	1	1	1
756	14788	0	0	1	1	1	1
757	14789	0	0	1	1	1	1
758	14790	0	0	1	1	1	1
759	14791	0	0	1	1	2	1
760	14792	0	0	1	1	1	1
761	14793	0	0	1	1	1	1
762	14794	0	0	1	1	1	1
763	14795	0	0	1	1	1	1
764	14796	0	0	1	1	1	1
765	14797	0	0	1	1	1	1
766	14798	0	0	1	1	1	1
767	14799	0	0	1	1	1	1
768	14800	0	0	1	1	1	1
769	14801	0	0	1	1	1	1
770	14802	0	0	1	1	1	1
771	14803	0	0	1	1	1	1
772	14804	0	0	1	1	1	1
773	14805	0	0	1	1	1	1
774	14806	0	0	1	1	1	1
775	14807	0	0	1	1	1	1
776	14808	0	0	1	1	1	1
777	14809	0	0	1	1	1	1
778	14810	0	0	1	1	1	1
779	14811	0	0	1	1	1	1
780	14812	0	0	1	1	1	1
781	14813	0	0	1	1	1	1
782	14814	0	0	1	1	1	1
783	14815	2	1	1	1	1	1
784	14817	0	0	1	1	1	1
785	14818	0	0	1	1	1	1
786	14819	0	0	1	1	1	1
787	14820	0	0	1	1	1	1
788	14821	0	0	1	1	1	1
789	14822	0	0	1	1	1	1
790	14823	0	0	1	1	1	1
791	14826	0	0	1	1	1	1
792	14827	0	0	1	1	1	1
793	14828	0	0	1	1	1	1

No.	1	2	3	4	5	6	7
794	14829	0	0	1	1	1	1
795	14830	2	1	1	1	1	2
796	14831	2	2	1	1	1	1
797	14832	0	0	2	1	1	1
798	14833	1	1	1	1	1	1
799	14835	0	0	1	1	1	1
800	14836	1	1	1	1	1	1
801	14837	0	0	1	1	1	1
802	14839	0	0	1	1	1	1
803	14840	1	1	1	1	1	1
804	14841	0	0	1	1	1	1
805	14842	0	0	1	1	1	1
806	14843	0	0	1	1	1	1
807	14844	0	0	1	1	1	1
808	14845	0	0	1	1	1	1
809	14846	0	0	1	1	1	1
810	14849	0	0	1	1	1	1
811	14850	0	0	1	1	1	1
812	14851	0	0	1	1	1	1
813	14852	0	0	1	1	1	1
814	14853	0	0	1	1	1	1
815	14854	0	0	1	1	1	1
816	14855	0	0	1	1	1	2
817	14856	0	0	1	1	1	1
818	14857	0	0	1	1	1	1
819	14858	0	0	1	1	1	1
820	14859	0	0	1	1	1	1
821	14860	0	0	1	1	1	1
822	14861	0	0	1	1	1	1
823	14862	0	0	3	1	1	1
824	14863	0	0	1	1	1	1
825	14864	0	0	1	1	1	1
826	14865	0	0	2	1	1	1
827	14866	0	0	1	2	1	1
828	14867	0	0	1	2	1	1
829	14868	0	0	1	1	1	1
830	14869	0	0	1	1	1	1
831	14870	0	0	1	1	1	1
832	14871	0	0	1	1	1	1
833	14872	0	0	1	1	1	1
834	14873	0	0	1	1	1	1
835	14874	0	0	1	1	1	1
836	14875	0	0	1	1	1	1
837	14876	0	0	1	1	1	1
838	14877	0	0	1	1	1	1
839	14878	0	0	1	1	1	1
840	14879	0	0	1	1	1	1
841	14880	0	0	1	1	1	1
842	14881	0	0	1	1	1	1
843	14882	0	0	1	1	1	1
844	14883	0	0	1	1	1	1
845	14884	0	0	1	1	1	1
846	14885	0	0	1	1	1	1
847	14886	0	0	1	1	1	1
848	14887	0	0	1	1	1	1
849	14888	0	0	1	1	1	2
850	14889	0	0	1	1	1	1
851	14890	0	0	1	1	1	1
852	14891	0	0	1	1	1	1
853	14892	0	0	1	1	1	1
854	14893	0	0	1	1	1	1

No.	1	2	3	4	5	6	7
855	14894	0	0	1	1	1	1
856	14895	0	0	1	1	1	1
857	14896	0	0	1	1	1	1
858	14897	0	0	1	1	1	1
859	14898	0	0	2	1	1	1
860	14899	0	0	1	1	1	1
861	14900	0	0	1	1	1	1
862	14901	0	0	1	1	1	1
863	14902	0	0	1	1	1	1
864	14903	0	0	1	1	1	1
865	14904	1	1	1	1	1	1
866	14905	0	0	1	1	1	1
867	14906	0	0	1	1	1	1
868	14907	0	0	1	1	1	1
869	14908	1	1	1	1	1	1
870	14909	1	2	2	1	1	1