

Incidence of Pearl Millet Diseases in Relation to Time of Sowing in Niger and Nigeria

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Introduction

Pearl millet [*Pennisetum glaucum* (L.) R. Br.] is widely grown in the Sahelian and sub-Sahelian Zones of Niger and Nigeria. Downy mildew [*Sclerospora graminicola* (Sacc.) J. Schröt.], smut [*Tolyposporium penicillariae* Bref.], and ergot [*Claviceps fusiformis* Loveless] are the three widespread diseases of pearl millet in Niger and Nigeria (Werder and Manzo 1992). Downy mildew is the most important disease, and yield losses of up to 50% have been reported from western Africa (Singh et al. 1993). Other diseases, especially smut and ergot, though of minor importance, can cause substantial yield losses in certain areas, environments, and genotypes (Thakur and King 1988ab). Despite the yield-reducing potential of downy mildew, smut, and ergot, their incidence has rarely exceeded economic threshold levels in most of the farmers' fields in Nigeria and Niger. Several reasons including genetic resistance to these diseases in the local landraces/cultivars and traditional cultural practices, probably result in low incidence of these diseases in these countries. The results of a study aimed at assessing the

incidence of downy mildew, smut, and ergot in relation to date of sowing in the farmers' fields in Nigeria and Niger is reported.

Materials and methods

The percentage incidences of downy mildew, smut, and ergot were monitored during a survey of farmers' fields between Kano and Katsina, Kano and Hadejia, and Kano and Samaru in Nigeria; and between Jibia and Maradi, Maradi and Dosso, Dosso and Niamey, Dosso and Bengou, and Bengou and Tanda in Niger. Surveys were conducted in the months of Jul, Aug, and Sep 1996 when the pearl millet crop was 45–65 days old (between flowering and dough stages). Observations were recorded at 10–40 km intervals, and fields on both sides of the road were scouted in a zig-zag fashion. An approximate area of 10 × 10 m was marked in each field and disease incidence was scored visually on a rating scale of 1–6, where 1 = no disease, and all the hills are healthy, 2 = 1–5%, 3 = 6–10%, 4 = 11–25%, 5 = 26–50%, 6 = >50% plants, or hills infected.

Additionally, individual farmers, or a group of farmers were also interviewed and information on the identity of the pearl millet varieties grown by the farmers, source of seed, date of sowing, and biotic and abiotic constraints to pearl millet production was obtained. Crop growth and disease status in several fields were monitored throughout the season in marked fields between Kano and Samaru, and Kano and Hadejia in Nigeria. Crop and disease development was monitored in a few fields between Jibia (Nigeria) and Niamey (Niger) three times during the 1996 cropping season.

Incidence of downy mildew, smut, and ergot was also monitored on research stations where pearl millet varieties GB 8735 (Gero 1), Ex-Borno and other advanced generation breeding lines were sown. Pearl

Table 1. Incidence of downy mildew (DM), smut (SM), and ergot (ER) at different sowing intervals in farmers fields in Niger and Nigeria, 1996.

Sowing date ¹	Disease incidence on 1–6 scale ²					
	Nigeria			Niger		
	DM	SM	ER	DM	SM	ER
Early	1.5	1.0	1.0	1.5	1.0	1.0
Mid-season	3.5	1.5	1.5	3.0	1.3	1.5
Late-season	5.5	3.5	2.5	5.5	3.0	1.7

1. Early = last week of May – 10 June, mid-season = 11 June – third week of June, late-season = last week of June – second week of July.

2. 1 = no disease, 2 = 1–5%, 3 = 6–10%, 4 = 11–25%, 5 = 26–50% and 6 = >50% plants or hills infected.

Table 2. Incidence of downy mildew (DM), smut (SM), and ergot (ER) in pearl millet cultivar Gero 1 (GB 8735) sown at different intervals in research stations and in on-farm trials in Nigeria 1996.

Sowing date	Sowing period ²	Location	Disease incidence on 1–6 scale ²		
			DM	SM	ER
4 June	Early	Bagauda	1.5 ³	1.0	1.0
5–10 June	Early	On-farm trials ⁴	2.0	1.5	1.0
26 June	Late	Minjibir	5.5	5.5	4.5
7 July	Late	Bagauda	6.0	5.5	5.5

1. Seed source same in all sowings.

2. 1 = No disease, 2 = 1–5%, 3 = 6–10%, 4 = 11–25%, 5 = 26–50%, and 6 = >50% plants or hills infected.

3. Only 10 plants with systemic infection of DM in an area of 0.25 ha.

4. On-farm trials were located at Kano, Jigawa, and Katsina, Nigeria.

millet variety Gero 1 was also evaluated in on-farm trials in Nigeria.

Depending on the onset of rains and local traditions, pearl millet was sown between last week of May to 20 July. Sowing dates were broadly categorized into three groups; 1 = early (last week of May – 10 June), 2 = mid season (11 June–third week of June), and 3 = late season (last week of June–second week of July).

Results and discussion

Of the 102 fields surveyed in Nigeria and 94 surveyed in Niger, 86 Nigerian and 74 Nigerien fields were sown early (sown soon after, or at the expectation of the first rain). About 10–15% farmers sowed during mid-season, while a few farmers (6%) sowed late in the season. All the farmers sowed local varieties, and only a few of them identified their cultivars as Ex-Borno.

Data on the incidence of diseases in relation to sowing date is given in Table 1. The percentage incidence of the three diseases ranged from <1% and 90%. Disease incidence varied between 1 and 60% in Gero 1 on research stations and in on-farm trials (Table 2). The lowest disease incidence was recorded in early sowings, and the highest in the late-sown crop. An estimated yield reduction of 75% was expected in the late-sown crop, irrespective of cultivar grown.

These investigations have shown that early-sown crops usually escape infection. Chahal et al. (1978) reported that early-sown pearl millet generally has less downy mildew than the late-sown crop in India. Similarly, the early-sown crop has been observed to be less infected by smut than the late-sown crop in Niger (Werder and Manzo 1992). Generally, the higher incidence of smut and ergot in a late-sown pearl millet crop coincides with high rainfall and high humidity during booting and flowering stages. In early-sown crops,

these growth stages occur in less humid conditions and thus escape infection by smut and ergot fungi.

The results of this survey suggest that early sowing of pearl millet minimizes the incidence of downy mildew, smut, and ergot. It is an integral part of traditional agricultural systems and the only disease management practice in Niger and Nigeria. This study emphasizes the need to include early sowing as a basic component in integrated disease management.

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