

IBPGR Newsletter n° 68 dec 86

pas de hes

cf 1524412/2  
no 86728  
Non

# Collection of Wild Millets in Burkina Faso and Niger

Serge Perge Edmond Louis  
S. Tostain 1/, S. Hamon 1/, E. Bernus 1/, L. Marchais 1/  
and G.B. Ingram 2/

remise perrot

During the last 10 years, a rich and complete collection of pearl millet landraces (Pennisetum glaucum - syn. P. americanum) from Africa and Asia has been made with the support and cooperation of IBPGR, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and Institut Francais de Recherche Scientifique pour le Developpement en Cooperation (ORSTOM). Unfortunately, no comprehensive collection of the annual, wild relatives in the primary gene pool of pearl millet (P. violaceum (Lam.) L. Rich - syn. P. mollissimum Hochst., P. americanum subsp. monodii (Maire) Brunken) currently exists. The sampling of germplasm of P. violaceum is needed to better understand its ecogeography, its relationship to cultivated pearl millet, its usefulness in millet breeding and the domestication process.

wild millet was facilitated by the existence of prior information. Grouzis (1979) published observations on the distribution of wild millet in Burkina Faso. With regard to Niger, Peyre de Favregues drew our attention to the regions of Tahoua (Ader, Douchi) and Falaise de Tiguidit. ORSTOM pearl millet collectors (Rene, Huttel, Borgel and Sequier) found wild millet in 1975 and 1976 at In Gall, Tanout and Goure.

In 1984, one of the authors (Ingram) collected annual Pennisetum species throughout Niger as part of IBPGR's ecogeographic survey of wild crop and forage genetic resources of the Sahel. The collection route is shown in Fig. 1 and collection sites in Fig. 2.

Recent studies (Marchais and Pernès, 1985; Marchais and Tostain, 1985) have shown that wild millets can provide new sources of cytoplasmic male sterility and increased pollen vigour. Frey et al. (1984) found in wild millet genes which increase the growth rate and grain yield of pearl millet. In addition, collecting of this species should not be delayed since the recent successive drought years in the Sahel have threatened its survival in many zones.

The whole area from Djibo in Burkina Faso to Nguigmi (East of Niger) was visited by different teams: Niamey-Filingué (Marchais, Tostain, 25-28 September), Burkina Faso (Marchais, Tostain, 3-10 October), Tahoua-Agadez-Nguigmi (Tostain, Hamon 13-28 October), Tillabéri (Tostain, 15-17 November), Azaouak Valley (Bernus, 15 November-20 December), and Tanout-Aïr Mountains (Ingram, Tostain, 22 November-12 December).

Many collecting sites were distant from roads and villages and could only be reached with a local guide and 4-wheel drive vehicle. Rainfall in 1985 (see 1985 isohyets in Fig. 2) was similar to the mean annual rainfall for the period 1964-84 but was considerably more than the previous year (Morel-Caille, personal communication). On the whole, rainfall was sufficient to ensure good growth of

## Methods

The actual distribution of this wild species is not well known, although many studies incidentally report its presence in sub-Saharan Africa. The collection of

1/ Institut Francais de Recherche Scientifique pour le Developpement en Cooperation (ORSTOM), B.P. 11416, Niamey, Niger  
2/ IBPGR Consultant



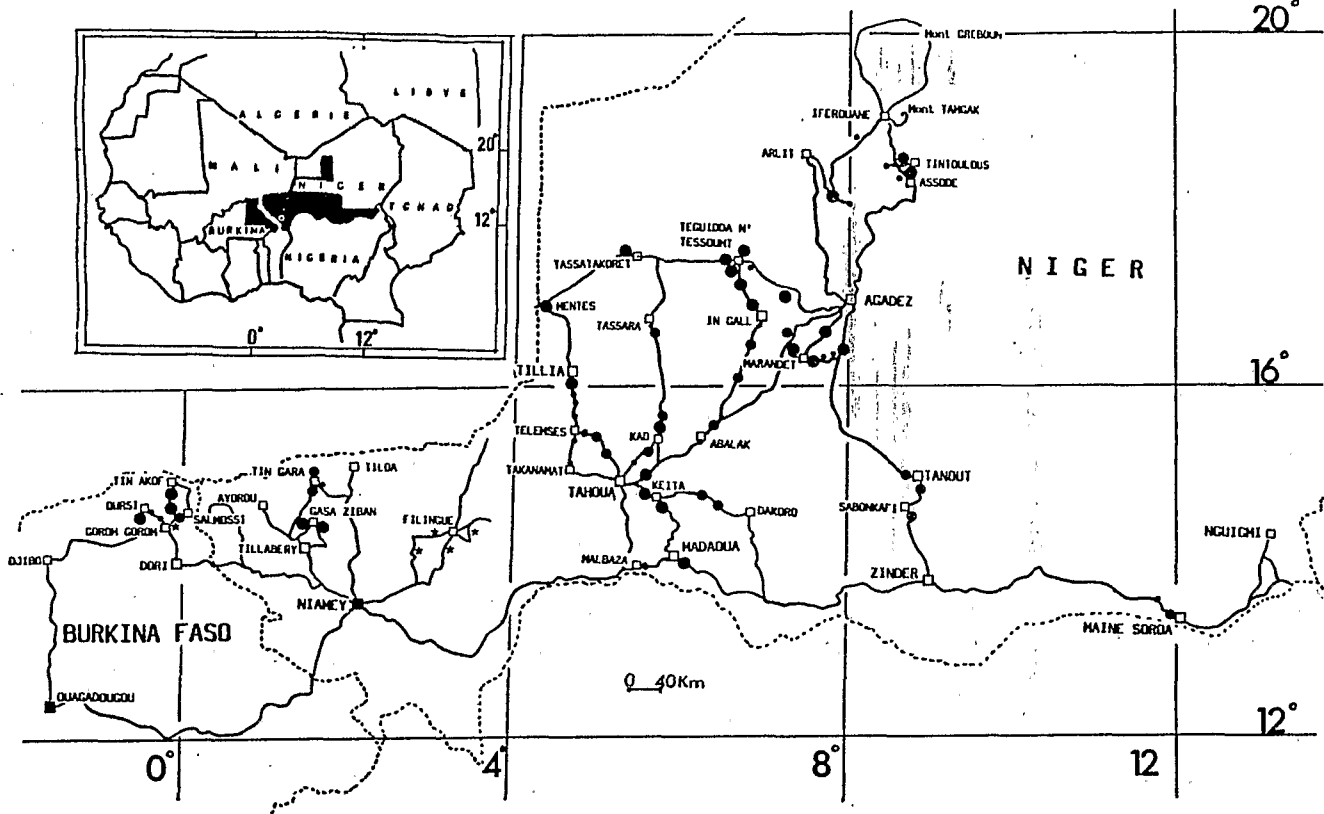


Fig. 1. General map of the collecting region, route and collecting sites.

Wild millet samples are marked by a circle;  
 ● = important population; ● = small population;  
 \* = Samples of intermediate types are marked by a star

wild millet at the sites visited. Some of the same collecting sites which had been previously visited during the severe 1984 drought, were devoid of plant life.

**Results**

76 wild millet samples and 5 samples of intermediates between wild and cultivated millets were collected from 81 different sites. Apart from the sample from Maïne-Soroa, all the wild samples were collected in an area situated between latitudes 14°N and 19°N, and where 1985 rainfall was less than 400 mm.

33 wild millet samples were collected, far from cultivated land or villages above latitude 16°N, in the pastoral zone that extends beyond the northern limit of

Sahelian grass, *Cenchrus biflorus*. In the pastoral zone, rainfall in 1985 was less than 200 mm.

The wild samples were collected in a specific ecological niche, associated with temporary streams flowing down hills or cliffs (Tillia, Mentés, In Tékébrine, Iguelala, Kao, Tiguidit). In the upper part of the stream a few isolated wild millet plants were growing between blocks of fallen rock at the source of the stream.

In the mid-section, and in association with *Acacia ehrenbergiana*, *Maerua crassifolia*, *Cymbopogon schoenanthus*, *Aristida funiculata* and *Lasiurus hirsutus*, *P. violaceum* formed a border alongside the gravelly stream bed. In the lower part of the watercourse, where the stream

bed expands on to the plain, wild millet formed large, dense, pure meadow-like stands. These were often bordered by arid, alluvial communities dominated by sparse grasses which occasionally had stands of Callotropis procera.

The preferred soil of this Pennisetum species is a mixture of clay and sand. It is not found on the coarse sand of the middle section, nor on the heavy clays lower down. Occasionally, for example at Teguidda n'Tessoumt, land relief is very slight. Bands of wild millet grow along the many ditches running across the plain in association with Panicum turgidum.

The 7 samples collected in the Air Mountains were from small populations which showed poor growth probably due to the harsh environment. The 21 samples extending from Falaise de Tiguidit to the Azaouak Valley, through In Gall and

Tegguida n'Tessoumt, formed large continuous stands. Curiously, in the pastoral zone, wild millet is not harvested and is not a preferred species for grazing by domestic livestock. Touareg shepherds were not aware of a relationship between the wild plant and cultivated pearl millet although they knew of the role of the intermediate forms, or "chibras".

48 wild millet samples were collected in the area south of the pastoral zone, i.e. south of a line joining Telemes, Abalak, Tanout, in which pearl millet is extensively grown where the annual rainfall is 200-400 mm. Wild populations were here also found on the edges of streams and ponds, but rarely in large stands.

Its niches here were artificially created on the borders of roads, dams,

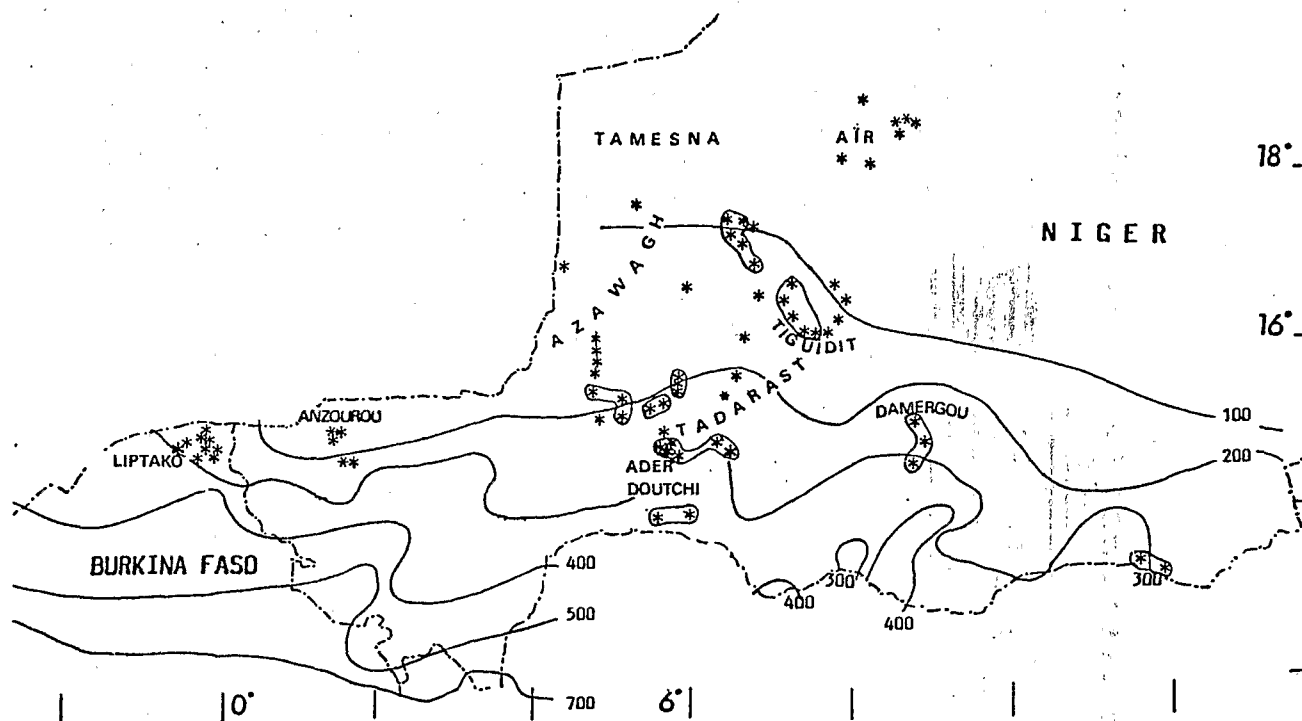


Fig. 2. Collecting sites (\*) and isohyets for 1985 (Météorologie Nationale du Niger); bounded areas indicate important populations

fields and hedges. Throughout the entire area collected, only parts of the available habitats were effectively occupied by wild pearl millet, which is a rare species with an erratic distribution. Most of the samples, with the exception of the 5 intermediate ones, were characterized by abundant tillering, and 10 cm-long, bright-blond spikes. Plant height varied from 30 cm in the driest soils to 200 cm in the best environments with a mean height of 120 cm.

As a rule, in areas where wild and cultivated millets were sympatric, the

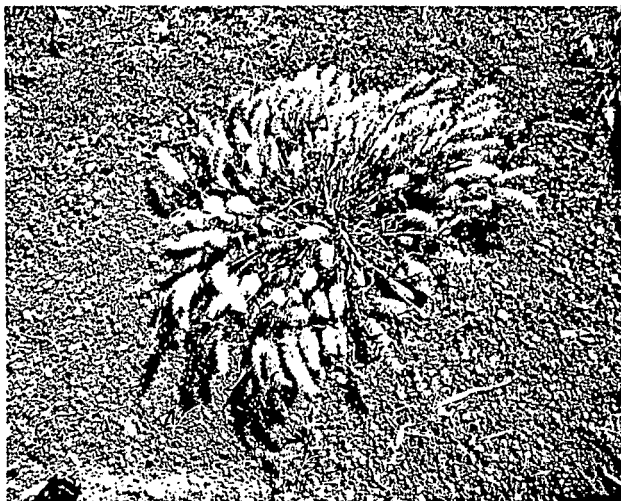


Fig. 3. Wild millet associated with Callotropis procera

cultivated millet flowering period lasted from 10 August to 1 September, whereas the wild millet flowering period started about 10 days later and lasted about 1 month due to the abundant tillering. P. violaceum can grow later in the season than cultivated millet partly because the former grows close to stream beds.

It has been generally observed that the overlapping of the wild and cultivated millet flowering periods makes free exchange of pollen possible between the 2 forms. Nevertheless, wild millet populations appeared to retain a remarkable degree of botanical identity, showing few intermediate forms with the spontaneous, "weedy" form of pearl millet, P. americanum subsp. stenostachyum (Brunken).

#### Conclusions

Although numerous distinct populations

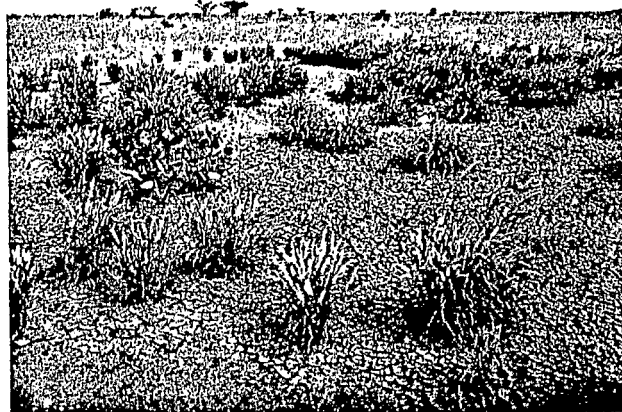


Fig. 4. Pennisetum violaceum near Birni-N'Konni, Niger

and environments remain to be visited, the 1985 work resulted in a highly diverse collection of samples of the wild annual from the primary gene pool of pearl millet from Niger and Burkina Faso. The distribution and ecology of this species in these 2 countries is better known, but the southern and northern limit of its distribution remain to be ascertained. It will be interesting to study the mechanisms by which wild millets keep their botanical identity in spite of pollen exchange with cultivated millets.



Fig. 5. Spike of Pennisetum violaceum

The erratic occurrence of this species indicates that its distribution is currently declining. Due to the often irreversible impact of desertification, i

is not able to re-colonize a site once it has disappeared.

The current ORSTOM collection should be increased by samples from Mali (Gourma, Adrar des Iforas). IBPGR is expanding its survey and sampling to include other parts of Niger and numerous unexplored areas of Mali, Cameroon and Chad.

The authors wish to express their gratitude to Mr. J. Newby (World Wildlife Fund International) for his assistance with the English draft of this article. Funds for the sampling mission were furnished by ORSTOM, except for the mission to the Aïr Mountains, which was under the auspices of IBPGR's ecogeographic survey of the Sahel.

#### References

Frey, K.J., Cox, T.S., Rodgers, D.H., and Bramel-Cox, P. 1984. Increasing cereal yields with genes from wild and weedy species, In, Genetics: New Frontiers - Proc. of the XV International Congress of Genetics, 4:51-68. Indian Soc. Genet. and Pl. Breeding, New Delhi.

Grouzis, M. 1979. Sur le Pennisetum violaceum sensu lato en Afrique de l'Ouest: formes, écologie et distribution géographique. Bull. de l'IFAN, 41 Série A: (2): 300-316.

Marchais, L. and Pernès, J. 1985. Genetic divergence between wild and cultivated pearl millets (Pennisetum typhoides) I. Male sterility. Z. Pflanzenzücht, 95:103-112.

Marchais, L. and Tostain, S. 1985. Genetic divergence between wild and cultivated pearl millets (Pennisetum typhoides). II. Characters of domestication. Z. Pflanzenzücht, 95:245-261.

#### Résumé

L'IBPGR et l'ORSTOM ont organisé une collecte de Pennisetum violaceum au Burkina Faso et au Niger en 1985. L'habitat écologique de l'espèce est limitée et la désertification pourrait la faire disparaître.

#### Resumen

Mijo silvestre fue recogido conjuntamente por el IBPGR y ORSTOM en Burkina Faso y Níger en 1985. El "habitat" ecológico de dicha especie es muy limitado y disminuye cada vez más a cause de la desertificación.