Seedball Technology Improves Pearl Millet Yield in Sahelian Production Systems

Nwankwo, C.I.[1], Herrmann, L.[1], Neumann, G.[2] Aminou, A. M [3]., Oumarou, H.M [4], Nouri, M.K [4], Sy, O [5].

[1] University of Hohenheim, Institute of Soil Science, Emil-Wolff Str. 27, 70599 Stuttgart, Germany
[2] University of Hohenheim, Institute of Crop Science, Fruwirthstr. 20, 70599 Stuttgart, Germany
[3] Federation of Maradi Farmers' Unions, FUMA Gaskiya, Niger
[4] National Institute of Agricultural Research of Niger, Departement de Culture Pluviales (DCP), Niger
[5] Institute of Agricultural Research (ISRA), Plant Production Department, Senegal

Contact: c.nwankwo@uni-hohenheim.de

Introduction

Improved seedlings establishment is still a challenging factor limiting pearl millet yield in the African Sahel. Well established seedlings are a prerequisite for higher grain yield. Already established solutions such as mineral fertiliser, seed treatment or irrigation are not accessible, in particular to women in subsistence farming systems, due to lack of skills and financial resources. In contrast, seedballs are a cheap technology based on locally available resources. It combines 80 g sand, 50 g loam, 25 ml water, 2.5 g pearl millet seeds and 1 g NPK-mineral fertiliser or 3 g woodash to produce about ten seed-containing balls of 1.5 — 2.0 cm diameter size. In greenhouse trial, it significantly increased shoot and root dry matter by 84 % and 94 % respectively, compared to conventional sowing. To ascertain these findings under real conditions, field trials were conducted.

Objectives

- to increase the panicle yield of pearl millet at Sahelian sites based on seedballs produced with local materials
- to compare pearl millet yield under different management (sowing time and depth)

Hypotheses

- locally produced seedballs increase pearl millet panicle yield in Sahelian sandy soils
- seedballs increase pearl millet yield in particular under dry sowing condition

Materials and methods

- in 2015 and 2016 planting seasons, over 300 Sahelian smallholder farmers were trained on how to produce seedballs (Fig. 3a & b)
- on-farm (mother and baby plot) trials were conducted in villages located in Maradi region of Niger Republic
- treatments were conventional sowing vs NPK- or woodash-amended seedballs
- "*easy-to-assess*" on-farm trials were conducted in six repetitions per village (Fig. 1)
- grain yield, dry panicle yield, and panicle number/plant were evaluated

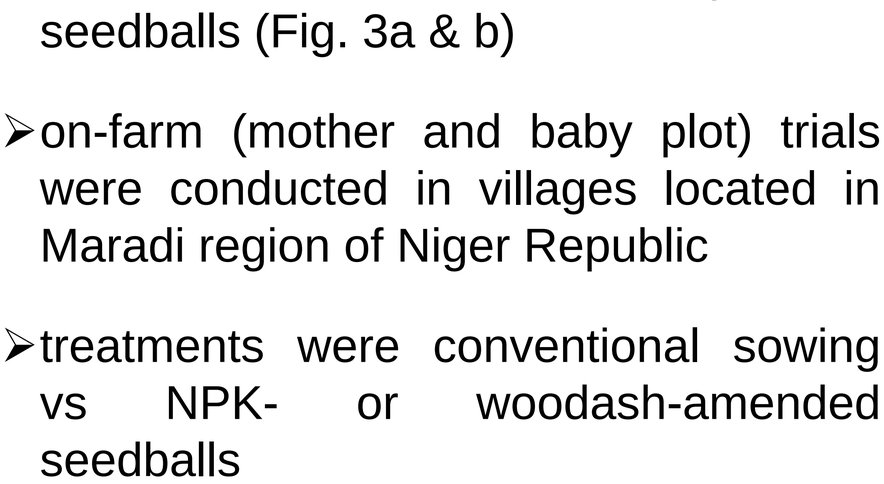

Figure 1: "*Easy-to-assess*" on-farm trial design. Wet = wet sowing, dry = dry sowing, surface = surface sowing, and deep = deep sowing (ca. 3 cm).

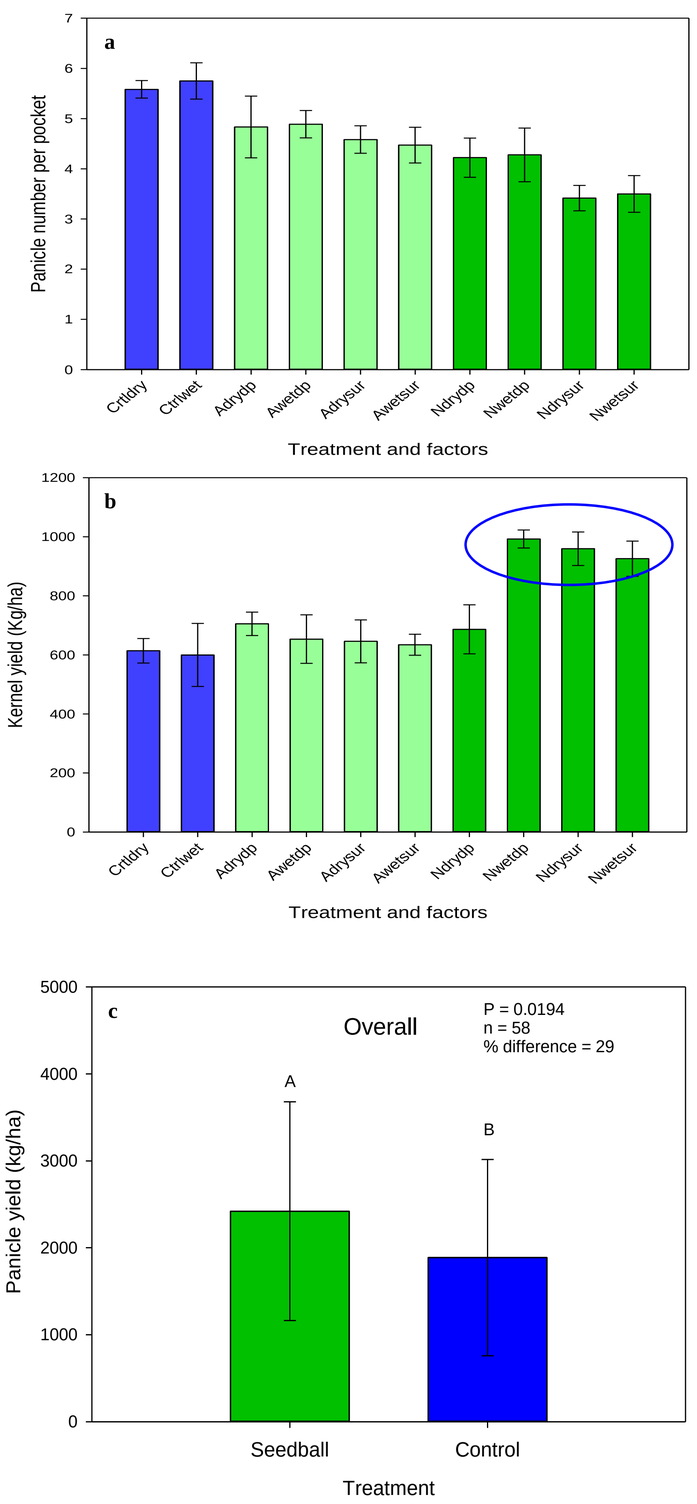

Figure 2: Treatments effects on (a) mother plots' panicle number per plant (b) mother plots' kernel yield per hectare and (c) baby plots' panicle yield per hectare. The mother and baby plots data were collected in 2015 and 2016 planting seasons, respectively. Ctr = control, A = woodash seedball, N = NPK-seedball, wet = wet sowing, dry = dry sowing, sur = surface sowing, and dp = deep sowing (ca. 3 cm).

Results

- seedball-derived plants produce less panicles per plant (Fig. 2a), but more grain yield per hectare (Fig. 2b)
- NPK enhanced panicle yield compared to woodash application and conventional sowing (Fig. 2b)
- seedball significantly increased panicle yield by 29 % in on-farm trials (Fig. 2c)

Conclusions

- the seedball technology is able to increase pearl millet panicle yield in subsistence oriented production systems
- dry and deep sowing favour panicle yield over wet and surface sowing

Figure 3: (a) Farmers' training (b) seedball samples produced after training in Maradi region, Niger Republic

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